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Listerian Oration.[1]

LISTER AS THE FIRST OF THE MODERN TRAUMATIC SURGEONS.

By C. W. B. LITTLEJOHN, C.B.E.,
Melbourne.

I HOLD it a high privilege to be invited here tonight to deliver the twenty-fourth Listerian Oration to the members of the South Australian Branch of the British Medical Association. It is a higher privilege still to have the honour of paying tribute to Joseph Lister, father of modern surgery, the man who made surgery safe for the patient.

It is the custom, in such addresses as these, to pay a few compliments to the illustrious person who is to be honoured; then for the orator—or rather the would-be orator—to produce some original and well-presented work of his own. Believe me, these remarks are made not with malice but in envy. I have an unbounded admiration for those slaves of enterprise who spend their leisure in the collection and dissection of cases and records, in the manufacture of graphs and protocols and the like. For me the relaxation of a comfortable chair and a book which requires neither thought nor concentration! My respected father-in-law, a man of great erudition and a highly successful attorney, says that the death of Edgar Wallace robbed British literature of its brightest gem. There is much to be said for this opinion.

I have no startling work to produce, and in any case it seems only fair that Lister should occasionally be the subject of the oration which bears his name. So tonight I beg your indulgence while I endeavour to indicate how Lister dominated and still dominates the field of traumatic surgery. For Lister was first and foremost a traumatic surgeon. How could he be otherwise? The surgery of his early day consisted in the opening of abscesses, the treatment of simple and compound fractures, amputations (only too often the result of the fractures), the removal of superficial growths, and cutting for stone. In addition, there were the ovariotomists, rather a race apart, like our modern gynæcologists, who owed their success mainly to the amazing resistance of the female pelvis, a region inured to insult of every description. And the surgery of the day was something terrific and terrifying. No need to dwell on the picture of the strong men detailed to hold the struggling and terrified patient, on the portentous figure of the surgeon in his stinking blood-stiffened frock coat, the assistant with the whipcord ligatures held between his teeth, the knife, the screams and the swift dispatch. The mortality was about 50%, with sepsis and its concomitant secondary hæmorrhage the chief factors.

Lister had the seeing eye and the inquiring mind, that element of curiosity which demanded to know the reason why. He was fortunate in his genes. He came of Quaker stock, sound and solid. His father, by calling a wine merchant—which seems incidentally a queer occupation for a Quaker, who is popularly supposed to drink nothing but cocoa—had a good business in London. He was an amateur of optics, so good an amateur that he perfected the achromatic lens for the microscope, thus helping considerably in his son's great achievement. So Joseph had in his inheritance the roots of his curiosity, of his habit of inquiry, of his pertinacity, and of the solidity required to carry inquiry to its goal.

At the age of seventeen he embarked on an Arts course, and it would appear that an attack of smallpox really

[1] Delivered at a meeting of the South Australian Branch of the British Medical Association on May 12, 1949.

vaccinated him with the desire to study medicine, an ambition which met no opposition from his parents. Perhaps here there is cause for meditation. Perhaps all medical students would be better for a preliminary study of the humanities before setting out on the utilitarian and soul-destroying study of medicine. If we look at the product of the medical schools, it is remarkable how many of the best of them did something else first, and commenced their strictly medical work with a background of more general experience. But I can see glum looks in the eyes of parents, who would like to know who is to pay the piper; already the medical course extends its weary length too far for the tax-depleted purse. One thing, however, is certain. When a boy leaves school he must, and I repeat must, start at once on something, a course, a job, employment of some sort, preferably something which interests him, and which demands from him his continuous attention. The idea of a year "off", a world trip, a season of leisure and indulgence, is the surest way to ruin any faculty of concentration, that concentration so essential in the treadmill of the first few years. I am reminded of a young man of my acquaintance who, on his release from the navy after three years of stultifying inaction, announced his intention of becoming a beachcomber. That was the life! It was only a violent attack of calf love, and the realization that beachcombing would hardly support the loved one in the manner to which she was accustomed, that weaned him from this ambition and set him to the serious study of the law. Meanwhile, of course, she married someone else.

But that is away from Lister, who apparently knew no leisure or indulgence in his life—something abhorrent to our minds, at any rate to mine, but which seems characteristic of the great men of the nineteenth century.

Lister commenced his medical course at the age of twenty, at University College Hospital. Medicine at the time was stagnant, and indeed remained stagnant for many years. Not yet were the days of insulin, of liver therapy, of glandular products, and of vitamins *A*, *B*, *C* and *L.S.D.* Sir Archibald Garrod, under whom I had the privilege of being a clinical clerk, was fond of telling a story about the great Gee—the physician responsible for the linctus. For one year Gee treated all his patients with *Liquor Ammoniæ Acetatis* and nothing else. Meanwhile his colleagues used all the drugs in the Pharmacopœia, including those gathered at the full of the moon with the chin on the left shoulder. At the end of the year the results were compared and Gee's figures were a fraction better than those of anyone else. It is fair to remember that 90% of the in-patients of the day were suffering from either typhoid fever or pneumonia. Lister was not impressed by the possibilities of medicine, but surgery was a different matter. As a student dresser his first case was one of hospital gangrene, and Lister was profoundly dissatisfied with his impotence in the face of the overwhelming infection. He had seen the dawn of anæsthesia, when in 1846 Liston amputated through the thigh under ether. This was a show piece, as the anæsthetist tried the ether first on the hospital dresser, or as we should call him, the theatre attendant. The man had a few good breaths, then wrecked the apparatus, felled the anæsthetist, chased the staff out of the theatre, and was finally quenched only by a cohort of onlookers. But the Quaker boy saw in this new invention an opportunity for a more deliberate surgery, for a planned campaign which might defeat at its source this dread devil of "putrefaction". He decided to be a surgeon.

Lister became house surgeon to Erichsen in 1851. Erichsen was a first-class surgeon, but more dexterous with the knife than with the pen, so that his reputation has not endured.

From University College Hospital Lister went to Edinburgh. This was the reverse of normal. English doctors have, or had, a horror of the Scots, who, having failed for the ministry, qualified for medicine in such large numbers that Scotland could not maintain them. They descended on the Sassenach, and, accustomed to frugality and hard work, made much hay. My tutor, Dodds-Parker, at Oxford used to say: "If you are called to a fracture in private practice, tell the patient that there is a very good Scots doctor round the corner whom he should call in. Let the Scot have the trouble, for bones are filled with black ingratitude."

But Lister went to Edinburgh. Syme was at that time the premier surgeon in the British Isles, and Lister was afire to seize the chance to work with him. He could afford it. How many bright young brains are condemned by poverty to trudge through life, harnessed to measles and influenza, harassed by midwifery at home and abroad! They used to say that to succeed in London you required £300 of your own. If you had less you could not; if you had more you would not.

Syme appreciated Lister. Perhaps he admired the effrontery which brought a Londoner to the hard and frozen north. At all events he made Lister his supernumerary house surgeon, then his resident house surgeon. The opportunity had come, and Lister was no man to let it pass. He wrote to his father: "Brilliant talent I do not possess, but I must try to make up for it so far as I can by perseverance." That was in 1853, and by 1856 he had added the Edinburgh Fellowship to the English Fellowship which he already possessed; he had set up as a surgeon in Edinburgh; he had been appointed a lecturer at the Royal College of Surgeons of Edinburgh, and he had married his master's daughter. Further than that, he had embarked on his life's work of conquering infection.

It is difficult for us to have a working realization of the surgery of the day. Some wounds healed and some did not. Always there was the bogy of putrefaction. The luckier patients overcame or localized their infection; others developed septicæmia and probably died. There was cross infection of the most virulent types, causing violent inflammation in wounds which were previously healing well. The general ideas were: (i) That putrefaction—or infection—was due to spontaneous development of some factor in the wound. (ii) That it was due to the access of air or of some miasma in the air.

Semmelweiss, in Vienna, in 1848 had concluded that puerperal fever was due to infection from without, and by the use of chlorinated water had reduced his mortality from 25% to a little over 1%. His theories gained no acceptance, and he retired in dudgeon. Long before this, putrefaction had been prevented by a variety of agents, such as honey, pitch, boiling oil. In 1552 Paré discarded boiling oil in favour of balsams. In 1720 Bellosti used alcohol. In 1766 Madame d'Arconville introduced corrosive sublimate. Larrey, in the Napoleonic wars, used cold water and alcohol. Lemaire in 1860 used carbolic acid as saponified coal tar. The observations were made, but the faculty of applying the observations was lacking. How closely the whole story resembles the discovery of the antibiotics! Fleming in 1929 made the observation that something about *Penicillium notatum* inhibited the growth of many varieties of bacteria, but shelved the matter, thinking that it might be of use only in methods of selective culture. It was left to Florey, of whom this State and all Australia must forever be proud, to produce penicillin, the greatest discovery since Lister's day. And Florey's investigations are reminiscent of Lister; there is the same persistence, the same attention to detail, the same labour, until the final success is achieved. One may say that after all it was not Fleming's job to develop penicillin; but what an opportunity lost!

But Lister had the inquiring mind as well as the seeing eye. He had the energy and perseverance to test his observations, to apply them in practice—to test again and again to apply. As Claude Bernard says: "In science the thing is to modify and change one's ideas as science advances." Lister himself said: "Do not think. Try." It is noteworthy that only in rare and outstanding persons do these faculties of the seeing eye and the inquiring mind occur together. Only last week I read Souttar's Hunterian Oration, in which he develops the same theme, pointing to John Hunter as a noteworthy example. I had to do some hurried rewriting lest I should be accused of plagiarism. Ronald Ross was another who combined the two, and outside of medicine there are other notable examples, but most often one man makes the observation and it is left to another to apply it. How fascinating it would be to know

who first thought of riding a horse and who first bestrode the brute! Or who invented the bow, or the wheel, or even the handle of an ax.

Lister in 1860 was Regius Professor of Surgery in the University of Glasgow. Still there was the same appalling mortality. As a result of his investigations into inflammation Lister had come to the conclusion that "putrefaction" was due to contamination from without. He visualized "infective particles" in the air. Methods of ordinary cleanliness were tried without avail; the heaps of clean towels in his wards excited only ridicule. Occlusive dressings to exclude the air proved ineffective. Lister said: "It occurred to me that decomposition in the injured part might be avoided without excluding the air by applying as a dressing some material capable of destroying the life of the floating particles."

Crude carbolic was being used on the sewage of the city of Carlisle to destroy worms, and thus to reduce the infestation of the cattle which fed on the pastures fertilized by the sewage. If carbolic would destroy this form of life why not try it on the floating particles? The story of Lister's successful treatment of a compound fracture in 1865 is well known; so too is the story of the tuberculous abscess. It was after these and many other successful results that his attention was drawn by the professor of chemistry to Pasteur's discovery in 1864 of the bacillary origin of fermentation in milk. Here were the floating particles; at once everything was clear—surgery was born.

Recognition came slowly. Professional men are notoriously chary of praising or imitating their immediate colleagues, and in England there was the usual campaign of detraction and ridicule. But on the Continent Lister's methods were acclaimed and followed, and soon Britain was constrained to conform. Not for a moment did Lister deviate from his chosen path. Work poured from his hands, and articles trickled much more slowly from his pen. He was perforce his own bacteriologist; he designed his own instruments; he sterilized his own dressings. He introduced the use of catgut and the method of its sterilization; he introduced the use of gauze as a dressing, and spent much time and labour in devising various antiseptics for its impregnation. His surgery was almost exclusively the surgery of trauma and deformity. He was the father of orthopædic and traumatic surgery. Lister was the first to open joints with impunity, to repair the fractured patella, to freshen bone ends in ununited fractures. He even pinned bones, using a four-sided nail to prevent rotation, the direct ancestor of Smith-Petersen's flanged nail. He performed the first osteotomies, anticipating Macewen by many years. He is even credited with the first suprapubic cystotomy.

Lister had no experience of war surgery, but the lessons which he learned, and the principles which he evolved from his treatment of civilian wounds, should have been the basis of successful war surgery in 1914. The lessons and the principles were forgotten, overlaid by the wave of "asepsis" which followed "antisepsis". Here are his principles:

For clean cases—
1. Clean the skin.
2. Prevent infection from without.
3. Prevent subsequent entry of germs.

For already infected cases—
1. Kill the germs already in the wound.
2. Prevent further infection.
3. If possible the germs already in the wound must be killed before they have time to multiply.

That might be marked "Technical Instruction No. 1".

Lister's method of killing the germs already in the wound was to slay them with carbolic acid. He recognized that this was destructive, but he did not succeed in devising any better method. And it may be said that no better method was devised until the introduction of excision and the development of blood-borne antiseptics. Non-destructive antiseptics suffer from the fact that they do not reach the true zone of infection, the invaded living tissue on the borders of the wound. In general, if the wound is well drained, the antiseptic is unnecessary; if drainage is inadequate the antiseptic is useless.

Lister had ideas, too, on inhibitory antiseptics, substances which might delay the multiplication of germs in wounds, although not actually destroying them. One of his pupils, Watson Cheyne, attempted to put this idea into practice at Gallipoli. He invented a paste of tricresol, and the idea was to squirt this paste from a collapsible tube into wounds which could not receive immediate surgical attention. Thus the multiplication of bacteria might be delayed beyond the "golden period" of six to eight hours. Unfortunately his directions were largely misunderstood; in many cases the paste was inserted and nothing further was done. Naturally the results were bad, and the method was discredited, perhaps unfairly.

I have said enough to indicate that Lister, this Colossus of surgery, went far beyond his time, and even with his methods of nearly a century ago could hold his own with the best of the traumatic surgeons of today. With the sulphonamides and penicillin, with stainless steel and vitallium, with X rays, with "Cellona", with blood, serum and electrolyte transfusion, with all our modern developments, what could he not do?

I think that the first thing that Lister would demand would be a traumatic unit as part of a general hospital. It would not be the orthopædic clinic, which has enough to do in its own particular sphere, although the orthopædist would of course be available to advise and if necessary to treat. So, too, would be the plastic surgeon and the neurosurgeon, with the thoracic and the abdominal surgeons at call; and physicians, too, radiologists, biochemists, bacteriologists. That is why a traumatic unit should be part of a general hospital and not a separate entity in itself.

The advantages are almost too obvious to mention—a twenty-four hour service, immediate and highly skilled attention, routine treatment and follow-up, convalescence and rehabilitation under supervision. The much-quoted objection, that teaching material is removed from the general clinics, is really rather futile, as not one general surgeon in ten ever teaches on trauma. All he does is to complain because so many of his beds are filled with fracture patients. Students would do three months or even more in the unit, in-patient and out-patient. Trauma is an important part of the general practitioner's work, far more important than the ever-encroaching "specialisms" which are creeping into the curriculum of the unfortunate student. Why, only the other day there was the suggestion that the student should suffer from twenty lectures in psychiatry. I am an old fogey now, and dyed white with the wool of Colonel Blimp. I would say give them six months' "hard" at general surgery, six months "hard" at general medicine, three months harder still at trauma, three months women, three months children, a touch of fever and a lesson in lunacy. Then you have provided the student with the strings of the fiddle; the bow is in his hand.

That is what I think that Lister would think. Lucas de Champonnière has said: "There are only two periods in surgery, that before Lister and that after him." High praise indeed. He is the greatest figure in surgery. We shall not see his like again.

A FIFTY YEARS SURVEY OF THYREOID DISEASE AT THE ROYAL PRINCE ALFRED HOSPITAL, SYDNEY.

By E. W. GIBSON and HUGH R. G. POATE,
Sydney.

AN attempt has been made to review the number of patients with disease of the thyreoid gland treated as in-patients in the general wards of the Royal Prince Alfred Hospital, Sydney, during the last fifty years. The total number of cases is 4813, of which 715 come into the first half of the period from 1898 to 1922 and the remainder of 4098 fall in the last twenty-five years, a peak period of 1134 cases occurring in the five years from 1933 to 1937.

Prior to 1913 no records were kept of the type of disease or of whether the patients were treated in medical or surgical wards. In the last thirty-five years 1334 patients with non-toxic goitre were treated in hospital, but records of 813 operations performed date back only for the last twenty years.

TABLE I.
Royal Prince Alfred Hospital: All Cases of Goitre.

Five-year Groups.	Number of Cases.	Number of Operations.	Number of Deaths.	Mortality Rate. (Percentage.)
1898 to 1902 ..	28	11	1	3·6
1903 to 1907 ..	104	57	0	0
1908 to 1912 ..	142	88	4	2·8
1913 to 1917 ..	257	159	17	6·6
1918 to 1922 ..	184	103	10	5·4
1923 to 1927 ..	433	168	19	4·4
1928 to 1932 ..	754	534	35	4·7
1933 to 1937 ..	1134	716	55	4·9
1938 to 1942 ..	905	674	47	5·2
1943 to 1947 ..	872	550	20	2·3

Of the patients with toxic thyreoid disease 1299 were treated in the medical wards and 1906 in the surgical wards; but again, operations listed cover only the last twenty years, when 1661 operations were performed, and it is a coincidence that during this period a similar number of patients were treated in surgical wards.

TABLE II.
Royal Prince Alfred Hospital: Non-Toxic Goitre.

Five-year Groups.	Number of Cases.	Number of Operations.	Number of Deaths.	Mortality Rate. (Percentage.)
1898 to 1902 ..	—	—	—	—
1903 to 1907 ..	—	—	—	—
1908 to 1912 ..	—	—	—	—
1913 to 1917 ..	107	—	—	—
1918 to 1922 ..	64	—	2	3·1
1923 to 1927 ..	129	—	0	0
1928 to 1932 ..	202	169	0	0
1933 to 1937 ..	286	214	3[1]	1·4
1938 to 1942 ..	226	180	2[1]	1·9
1943 to 1947 ..	320	250	3[1]	1·2

[1] See context; real post-operative mortality rate is 0·7%.

In the ten years from 1928 to 1937, 867 operations were carried out on 947 patients, whereas in the last ten years 794 operations were performed on 714 patients, probably because of two-stage operations. There were 82 deaths in the medical wards, a 6·3% mortality rate, whilst on the surgical side 1906 patients were treated with 111 deaths—a mortality rate of 5·8%. On examination of the figures in each five-year period it will be noted that the mortality rate on the medical side rose on the whole from 4·8% to 9·3%, but dropped to 3·2% in the last five years, possibly the result of thiouracil treatment introduced in the latter half of 1943. On the surgical side there has been a steady decline from 19·0% to 3·3%, mainly, it is thought, owing to better preparation for operation, improved technique, improved anæsthesia and earlier operation.

From 1913 to 1927 the number of patients with toxic thyreoid conditions treated medically was greater than the number of those treated surgically (329 to 245), but from 1928 to 1942 the number treated surgically greatly exceeded the medical cases (1393 to 686); yet in the last five-year period there were 284 medical cases as against 268 surgical cases, possibly owing to the greater number of patients being treated by "thio" compounds, as well as to the steadily increasing number of patients with non-toxic conditions being referred for surgical treatment before toxicity ensued.

TABLE IV.
Deaths from Thyreoid Disease in New South Wales.

Five-year Groups.	Toxic Goitre.	Other Thyreoid Diseases.	Total.	Rate per Million.	
				Toxic Goitre.	All Cases Thyreoid Diseases.
1898 to 1902[1]	—	—	40	—	5·8
1903 to 1907[1]	—	—	69	—	9·4
1908 to 1912 ..	107	31	138	13·0	16·9
1913 to 1917 ..	100	62	162	10·6	17·1
1918 to 1922 ..	108	68	174	10·5	17·1
1923 to 1927[2]	160	98	258	13·8	23·0
1928 to 1932 ..	232	100	332	18·3	26·6
1933 to 1937[3]	344	69	413	25·9	33·4
1938 to 1942 ..	405	121	526	29·2	37·9
1943 to 1946[4]	207	103	310	17·8	26·7

[1] Prior to 1906 no differentiation was made.
[2] From 1922 diseases of the parathyreoids were separated.
[3] From 1936 myxœdema and cretinism were separated.
[4] Four-year period only.

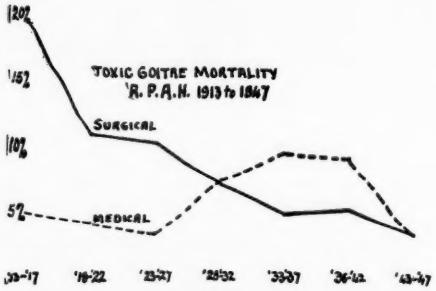

FIGURE I.

A mortality rate of 1·2% to 1·9% seemed relatively high for non-toxic goitre. In the last fifteen years there were

TABLE III.
Royal Prince Alfred Hospital: Toxic Goitre.

Five Year Groups.	Medical.			Surgical.			
	Number of Cases.	Number of Deaths.	Mortality Rate. (Percentage.)	Number of Cases.	Number of Operations.	Number of Deaths.	Mortality Rate. (Percentage.)
1898 to 1902	—	—	—	—	—	—	—
1903 to 1907	—	—	—	—	—	—	—
1908 to 1912	—	—	—	—	—	—	—
1913 to 1917	83	4	4·8	67	—	13	19·0
1918 to 1922	74	3	4·1	46	—	5	10·9
1923 to 1927	172	6	3·5	132	—	13	10·0
1928 to 1932	151	11	7·3	401	365	24	6·8
1933 to 1937	302	28	9·3	546	502	24	4·8
1938 to 1942	233	21	9·1	446	494	24	5·4
1943 to 1947	284	9	3·2	268	300	8	3·3

TABLE V.

Post-Operative Deaths, Toxic Goitre, Royal Prince Alfred Hospital, 1930 to 1934 (Inclusive).

Number; Record Number.	Sex; Age. (Years.)	Days in Hospital Before Operation.	Pre-operative Treatment.	Basal Metabolic Rate Before Operation.	Anæsthetic.	Cause of Death and Time After Operation.	Post-mortem Findings.
I 583 (Simple)	F. 52	5	Digitalis; I_2, m. 10, t.d.s.[1] Sedatives.	+34%	——	Possible thyreoid reaction and cardiac failure.	Nodular goitre, dilatation of heart, multiple infarcts in kidney and spleen.
II 985 (Simple)	F. 57	6	No pre-operative I_2; P/B, 0·5 grain b.d.	?	Nitrous oxide and oxygen.	Thyreoid crisis and liver failure 36 hours after operation.	Liver: hæmorrhage, fatty degeneration and necrosis. Thyreoid: no record.
III 451 (Toxic surgical)	F. 15	58	I_2, m. 5, t.d.s. KBr and chl. hydr.	+46%	Ethylene.	Thyreoid crisis and tetany five days after operation.	Some hepatitis. Thyreoid: hyperplastic.
IV 468	F. 54	30	I_2, m. 3, t.d.s. KBr and chl. hydr.	+46%	"Avertin", local.	Cardiac failure in 24 hours.	No autopsy.
V 501	F. 36	21	I_2, m. 5, t.d.s. KBr and chl. hydr.	+105%	Ethylene, local.	Cardiac failure (possibly crisis) same day.	Myocardial spoiling; possibly hepatitis.
VI 516	M. 32	30	I_2, m. 10, t.d.s. NaBr.	+21%	"Avertin', local.	Auricular fibrillation and cardiac failure in three days.	No record.
VII 522	F. 62	6	I_2, m. 10, t.d.s. KBr and chl. hydr.	+39%	Ether (intratracheal route).	Possible ventricular fibrillation in one hour.	Goitre: nodular and hyperplastic. Liver: atrophic, degeneration. Nephritis.
VIII 523	M. 46	22	I_2, m. 3, t.d.s. KBr and chl. hydr.	+59%	"Avertin" and ethylene.	Cardiac failure, bronchopneumonia. Possible thyreoid crisis, 30 hours.	Liver: Small with fatty degeneration. Thyreoid: hyperplastic.
IX 544	F. 21	36	I_2, m. 10, t.d.s. Sedatives, vitamins, glucose.	+73%	"Amytal" and ethylene.	Cardiac failure, same day.	Thyreoid: hyperplastic. Liver: small.
X 626	F. 45	8	I_2, m. 5, t.d.s. Sedatives.	+18%	"Avertin" and ether (intratracheal route).	Thyreoid crisis; 30 hours.	No record.
XI 658	F. 42	15	I_2, m. 3, t.d.s. KBr P/B.	+48%	"Avertin" and ether ("open" method).	Cardiac failure, auricular fibrillation; four days.	Toxic myocarditis, atelectasis.
XII 669	F. 48	44	I_2, m. 8, t.d.s. KBr, digitalis.	+15%	Nitrous oxide and oxygen.	Auricular fibrillation; cardiac failure. Possible thyreoid crisis; two days.	No record.
XIII 690	F. 23	90	I_2, m. 8, t.d.s. KBr, P/B, digitalis.	+40%	Nitrous oxide and oxygen. Great technical difficulty at operation.	Auricular fibrillation; cardiac failure. Same day.	No record.
XIV 700	F. 44	34	I_2, m. 10, t.d.s. KBr and chl. hydr.	+38%	"Amytal" and ether ("open" method).	Thyreoid crisis; cardiac failure.	Thyreoid: hyperplastic. Liver: small.
XV 715	F. 60	46	I_2, m. 5, t.d.s. KBr, P/B.	+58%	Ether (intratracheal route).	Toxic myocarditis and pulmonary thrombosis; 14 days.	Thyreoid: adenoma, hyperplastic. Liver: small.
XVI 716	M. 57	60	I_2, m. 5, t.d.s. KBr, digitalis.	+25%	Nitrous oxide and oxygen.	Thyreoid crisis; 18 hours.	Toxic myocarditis. Liver: small.
XVII 725	F. 43	41	I_2, m. 5, t.d.s. KBr and chl. hydr.	+30%	Ether (intratracheal route).	Auricular fibrillation, bronchopneumonia; seven days.	Thyreoid: patchy fibrosis, irregular hyperplasia. Toxic myocarditis. Lungs: bronchopneumonia.
XVIII 743	M. 23	7	No iodine. No sedatives. Quinine.	+21%	Ether (intratracheal route).	Thyreoid crisis; 24 hours.	No record.
XIX 744	F. 27	23	I_2, m. 3, t.d.s. KBr and chl. hydr.	+61%	Nitrous oxide and oxygen.	Thyreoid crisis; three days.	No record.
XX 779	F. 40	16	No iodine. Barbitone. Digitalis.	+26%	Ethylene.	Under anæsthesia, before operation.	No record.
XXI 805	F. 56	14	I_2, m. 3, t.d.s. KBr.	+29%	Nitrous oxide and oxygen.	Operative shock, hæmorrhage into operation site, liver failure; 18 hours.	Arteriosclerosis. Liver: fatty infiltration.
XXII 807	F. 70	17	No iodine before operation. P/B, 0·5 grain.	+32%	Ether (intratracheal route).	Possible bronchopneumonia; two days.	Thyreoid: adenomata, some hyperplasia. No other record.

[1] I_2, Lugol's iodine; m., minims; P/B, phenobarbitol; KBr, potassium bromide; chl. hydr., chloral hydrate; t.d.s., to be taken three times a day; b.d., twice a day; NaBr, sodium bromide.

644 operations for this condition and eight deaths are recorded—a mortality rate of 1·2%. A close investigation was made of these cases and it was found that four of the patients died as a result of post-operative pulmonary complications, while two others were really medical patients, as no operation was performed; one died of cardiac failure and ascites and the other was admitted to hospital in a moribund condition due to bronchopneumonia, but had a large thyreoid causing some obstruction. In two other cases (583 and 985) thyreotoxicosis had not been recorded, and both patients died in "thyreoid crisis".

If these last four cases are excluded it will be seen that the real mortality rate for non-toxic goitre treated surgically should be taken as about 0·7%.

As an appendix to this paper there is a list of relevant details, as far as they could be ascertained, of 22 deaths following operation for thyreotoxicosis and including the two cases mentioned above. The average mortality rate in a big general hospital with a large surgical staff must always be higher than that of the individual specialist, in whose hands the mortality rate of operation for non-toxic goitre is practically nil and for toxic goitre is 0·25% or less. Many clinics are now presenting series of cases of thyreotoxicosis running into 600 or more, in which preparation with "thio" compounds has been used, without any surgical mortality, and our own experience with some 400 operations is equally successful.

The Registrar-General has kindly supplied figures for New South Wales as to deaths from disease of the thyreoid

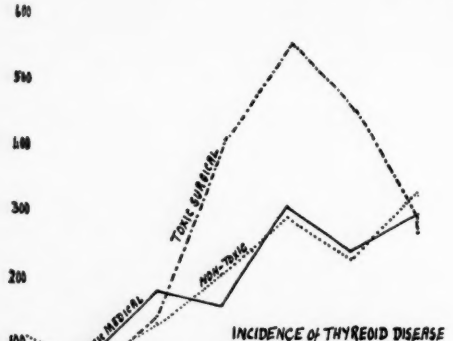

FIGURE II.

gland, which, taken over fifty years, show a relatively alarming increase from a total of 40 deaths in the 1898-1902 period up to 526 in the 1938-1942 period. Since 1942 only four years' figures are available, giving a relatively decided drop to 310 or, compared with the previous period on an annual average, from 105 to 62; but it is in the years 1944, 1945 and 1946 that the number of deaths, especially from toxic goitre, shows a definite decline.

These figures refer to the total diseases of the thyreoid gland, but since the year 1922 diseases of the parathyreoid glands have been included; yet they are so few that the numbers quoted are hardly affected.

Taken on the death rate per million of the mean population, the rise is just as remarkable, for the mortality rate in the period 1898-1902 was only 5·8 per million and it rose steadily up to 37·9 per million in the 1938-1942 period. In the four years from 1943 to 1946 it fell to 26·7 per million, the main fall being in deaths from toxic goitre, the mortality of which had risen steadily prior to this.

The number of patients with thyreoid disease admitted to the Royal Prince Alfred Hospital during the 1943-1947 period is little less than the number in the previous five-year period; but it is to be noted that the mortality rate in this period has shown a considerable reduction, from 5·4% to 3·3% on the surgical side and from 9·1% to 3·2% on the medical side, thus conforming to the general fall shown in the vital statistics.

From 1936 myxœdema and cretinism have been separately recorded by the Registrar-General in New South Wales, and it is not without interest to note that from 10 to 21 such cases are listed each year. As will be seen from Figure III, the death rate per million of mean population is not high; but it is probable that with a steadily increasing rate of goitre in the community the incidence of myxœdema and cretinism will also rise, even though diagnosis and treatment should now be on a high standard. To judge from some of the patients referred to one of us (H.R.G.P.), however, cretinism is often wrongly diagnosed, as many cases of mental deficiency due to other causes are classed as of thyreoid deficiency, and it seems likely that some of the deaths may be wrongly diagnosed also.

Since 1922 diseases of the parathyreoid glands have also been separately recorded; but in the twenty-five years from 1922 to 1946 only 23 cases have been noted—an incidence rate of but 0·3 per million of mean population.

Apparently carcinoma of the thyreoid gland is not listed separately, although its incidence in our experience must be very much greater than disease of the parathyreoid glands. In view of the constant recording of deaths from simple goitre, one may well wonder if any of these are not really due to supervention of carcinoma on an old adenomatous condition in the thyreoid gland, as some 90% of cases of carcinoma of the thyreoid occur in such a condition; this is an added reason why patients with adenoma of the thyreoid should be submitted to surgical treatment before the onset of either toxicity or malignant disease.

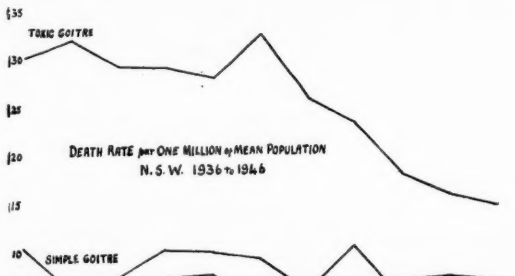

FIGURE III.

It would appear that, although diseases of the thyreoid gland and in particular thyreotoxicosis have increased greatly in New South Wales during the last thirty years or so, with improved knowledge of the condition and with improved medical and surgical treatment we can look forward to a still further decrease in the mortality rate. The all-important point of prophylaxis should now engage the earnest attention of the public health authorities as well as that of the medical profession. Interest is being awakened in the Australian Capital Territory area, but much remains to be done along the whole of the eastern and southern parts of Australia, in order to check the prevalence of the more serious diseases of the thyreoid gland which so often become engrafted on simple colloid goitres.

A RAPID METHOD OF TESTING THE SENSITIVITY OF TUBERCLE BACILLI TO STREPTOMYCIN.[1]

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MUCH has been written of the ease with which certain bacteria develop resistance to the action of antibiotics, and clinicians frequently ask for information on this point in relation to the tubercle bacillus, especially since increasing amounts of streptomycin are becoming available for therapeutic purposes.

The slow rate of growth of the tubercle bacillus is a handicap in the laboratory investigation of its response to contact with streptomycin, even in such a chronic disease as tuberculosis.

[1] Read at a meeting of the Australian Society of Clinical Pathologists on May 28, 1949.

The accepted method hitherto has been to isolate a pure culture on solid medium from biological material such as sputum or gastric washings, and to test it by subculture into several tubes of liquid medium, each containing a different concentration of the drug. The time occupied in this double procedure is seldom less than two months.

It was decided to investigate the possibility of shortening this time, and three aspects of the problem called for attack: (i) the development of a solid medium into which streptomycin could be incorporated, in order to avoid difficulties entailed in working with liquid cultures; (ii) improvement of the method of preparing inocula from samples of pus or sputum in which the customary techniques do not yield homogeneous material; (iii) the possibility of inoculating biological material directly on to the test medium containing streptomycin.

Materials.

Medium.

It was found possible to use potato agar as a base, enrich it with asparagin, inorganic salts and sterile egg yolk, add an inhibitory dye (malachite green) and streptomycin in the desired amount; and so to produce a solid medium which could be stored for periods up to one month without loss of activity of the antibiotic.

Potato agar is prepared as follows:

Press 500 grammes of peeled potato through the mincer. Add this to 1000 millilitres of distilled water. Add 40 millilitres of glycerin. Mix well and place in a steamer for one hour. Press through cheese cloth in a small press. To every 500 millilitres of extract add 1500 millilitres of 0·6% sodium chloride solution and 50 grammes of agar powder. Dissolve in the steamer. Weigh out 3·0 grammes of sodium phosphate, 4·0 grammes of potassium dihydrogen phosphate, 0·6 gramme of magnesium sulphate, 2·5 grammes of potassium citrate and 5·0 grammes of asparagin. Dissolve these in 20 millilitres of distilled water, and add this amount to each litre of potato agar. Add 10 millilitres of a 2% aqueous solution of malachite green to each litre. Sterilize the medium in the steamer for one hour on each of three consecutive days.

This medium will keep indefinitely.

Sterile egg yolk is prepared as follows:

Wash new-laid eggs in running water and scrub with a soft brush. Place in 70% alcohol for ten minutes. Drain. With a spoon place each egg in boiling water in a beaker for ten to fifteen seconds. Remove, and holding the egg by one end, crack the other with a sterile spoon and allow contents to slide gently into a sterile Petri dish. Remove albumen with a sterile pipette. With another sterile pipette, pierce the yolk membrane and remove the yolk to a sterile flask containing glass beads. Shake well to mix, and use within twelve hours of preparation.

Streptomycin solutions are prepared as follows:

Store concentrated solution (100,000 microgrammes per millilitre) at −20° C. Prepare fresh dilutions in sterile distilled water of 10,000, 1000, 100, and 10 microgrammes per millilitre on the day of use.

The final medium is prepared in the following way:

Melt a flask of the buffered asparagin potato agar. Cool it to 48° C., add 10% of sterile egg yolk, add sufficient streptomycin to produce a final concentration of either 1000, 100, 10 or one microgramme per millilitre of finished medium. Distribute in amounts of about six millilitres into previously autoclaved one-ounce screw-capped vials, and slope. Prepare a batch without streptomycin as controls. Store in the refrigerator up to one month.

Inoculum.

It was found that specimens of very purulent sputum could be homogenized with a few drops of normal sodium hydroxide solution and then submitted to acid digestion at 37° C., and this produced a much more uniform inoculum.

Pipette about 1·0 millilitre of sputum into a hard glass centrifuge tube. Add about 0·2 millilitre of normal sodium hydroxide solution and shake carefully until homogenized; this takes two or three minutes. Then add one to one and a half volumes of 3·4% sulphuric acid, shake well, and digest at 37° C. for thirty minutes. Add a drop of phenol red solution, neutralize with normal sodium hydroxide solution and centrifuge. Discard all but 0·5 millilitre of the supernatant fluid. Mix the sediment in the fluid with a Pasteur pipette before inoculating it on to five bottles of medium, control, and the four bottles containing streptomycin (1000, 100, 10, and one microgramme per millilitre). Incubate at 37° C. and observe weekly.

Results.

Preliminary trials of the medium were made with emulsions of pure cultures of *Mycobacterium tuberculosis* standard strains, human, bovine and avian, as well as two cultures isolated from patients, one of whom had been treated with streptomycin and one who had not. After three weeks' incubation, the results were as shown in Table I.

TABLE I.

Source of Material.	Control.	Medium Containing Streptomycin. (Microgrammes per Millilitre.)			
		1	10	100	1000
Mycobacterium tuberculosis human H 37Rv. ..	+++	+	−	−	−
Mycobacterium tuberculosis bovine	+++	+	−	−	−
Mycobacterium tuberculosis avian	+++	+	±	−	−
Patient S. No streptomycin	++	−	−	−	−
Patient B. 90 grammes of streptomycin	+++	+++	+++	+	Five colonies

Twelve samples of sputum were obtained and treated according to the method described. The results after three weeks' incubation were as shown in Table II.

The tests were observed for one month, and a report was made when three weeks had passed.

In eight instances the tests were carried out in duplicate and there was good agreement between the two sets of cultures. When inhibition of growth was considerable there might be seven colonies on one culture and fourteen on the duplicate, but in no instance was there absence of growth on one culture and presence on the duplicate.

TABLE II.

Patient.	Amount of Streptomycin.	Control.	Medium Containing Streptomycin. (Microgrammes per Millilitre.)			
			1	10	100	1000
L.	None.	+++	+	−	−	−
H.	None.	+++	+	−	−	−
D.	None.	+++	−	−	−	−
I.	None.	+++	−	−	−	−
B.	None.	+++	−	−	−	−
S.	None.	+++	−	−	−	−
F.	60 grammes.	+++	++	+	+	+
H.	291 grammes.	+++	+++	++	++	+
M.	90 grammes.	+++	+	+	−	−
T.	49 grammes.	+++	++	+	−	−
R.	80 grammes.	+++	+++	++	−	−
W.	104 grammes.	+++	++	−	−	−

Discussion.

Since the introduction of surface active agents such as Tween 80, it has been possible to obtain rapid submerged growth of the tubercle bacillus in liquid media (Dubos, 1946), and workers were hopeful that this substance would be of help in the evaluation of tuberculostatic agents such as streptomycin. However, it was reported early in 1948 by Myron Fisher (1948) that the use of Tween 80 considerably enhanced the activity of streptomycin in the test tube. The addition of purified albumin to the medium increased the growth rate of the organisms, but did not completely block the action of Tween 80, and it was realized that such techniques had the serious disadvantage of making the antibiotic appear more effective than it was.

The American Trudeau Society (1948) has a laboratory subcommittee on streptomycin which is endeavouring to obtain some uniformity of technique in the tests for sensitivity, and in 1947 they recommended a liquid medium modified from Proskauer and Becks's formula enriched with the addition of sterile plasma or preferably purified albumin.

In the attempt to cultivate biological material directly into liquid medium, however, the clouding immediately on inoculation makes it impossible to use turbidity as a criterion of growth, and frequent microscopic examination and subculture become necessary.

More recently a personal communication from Dr. Youmans (1948) indicates that a return to solid media is being made, the formula of Herroid (1931) for egg yolk agar being suggested. The present medium has the advantage that the potato agar base is simple to prepare and store in reasonable quantities. The egg yolk enrichment is satisfactory, and the risk of introducing contaminants is lessened by the presence of the dye.

It will be noted that the amount of malachite green used is half that commonly recommended in egg media. This amount was decided upon after a titration experiment had shown that it was sufficient to inhibit both *Staphylococcus aureus* and *Bacterium coli*, and not to affect the growth of *Mycobacterium phlei*.

The use of screw-capped vials as containers was a distinct advantage in the prevention of drying of the medium, and in the course of the work contaminating organisms appeared only twice on stored media.

The inoculation of sputum digest sediment directly on to the medium carries the risk that a small concentration of bacilli in a sample may not be distributed evenly, and so one culture may not contain viable bacilli; this is true and must not be overlooked. In the present series, one sample did not show any bacilli on microscopic examination of a drop of the inoculum; however, the control tubes had five colonies on one and eleven on the duplicate. It is felt that careful preparation of the inoculum is the major element in producing a satisfactory test, and time is well spent in ensuring homogeneity of a thickly purulent specimen.

This discussion has been limited to the use of sputum as biological material. Recently a sample of post-mortem brain tissue obtained by Dr. Stephen Williams at the Royal Alexandra Hospital for Children was tested by this method. The patient had been treated with streptomycin given intramuscularly, and temporary improvement had occurred before relapse and death. At the same time, a culture of a single colony of tubercle bacilli from the cerebro-spinal fluid of another patient was tested. Each culture was made in duplicate. Growth of both these meningeal strains was slow to begin, though there was abundant growth on the controls after one month's incubation. There was no growth whatever on the streptomycin-containing medium. It was thought advisable to repeat the tests, and emulsions were prepared from the control tubes and inoculated on to further sets of media. This time growth was rapid, colonies were visible in two weeks on the control medium and on that containing one microgramme of streptomycin per millilitre, and in the case of the post-mortem strain, also on the medium containing 10 microgrammes of streptomycin per millilitre. These observations are perhaps relevant in the light of the statements often made that meningeal and miliary strains of *Mycobacterium tuberculosis* do not show resistance to streptomycin. In the post-mortem material, Ziehl-Neelsen staining showed the numbers of bacilli to be small, and it is possible that in the original test they were not viable in sufficient numbers to grow except in the control. The second test performed with an actively growing culture contained a larger number of partially resistant variants which then emerged. It may be noted that the standard strains were tested on these media at the same time and behaved normally.

The clinician is always glad of help from the laboratory and is eager to find significance in reports furnished to him; but the true interpretation of tests of the sensitivity of tubercle bacilli to the effect of streptomycin is not yet known. Large-scale tests of a bacterial population of any kind will reveal the presence of variants which behave differently from the majority. The Trudeau Society report urges that cultures should always be isolated and studied before a patient is subjected to streptomycin therapy, and that periodically cultures should be tested for the development of resistance. The small series of tests here recorded contrasts the findings in untreated and treated patients, and provides evidence that there is a difference. However, the demonstration, during treatment of tuberculosis with streptomycin, of organisms resistant to its action, is evidence that such variants are present; but it gives no information as to their proportion in the bacterial population or as to the balance between the organisms and their host—that is, as to the state of the tuberculous process.

Summary.

1. A solid medium is described which is suitable for the cultivation of *Mycobacterium tuberculosis* and also suitable for the incorporation of streptomycin.

2. A modified method of preparing biological material for the cultivation of *Mycobacterium tuberculosis* is described.

3. A rapid method of testing the sensitivity of *Mycobacterium tuberculosis* to streptomycin is described.

4. Results of a small series of tests are recorded. Of six samples of sputum from patients who had not received streptomycin, growth in four was completely inhibited by a concentration of one microgramme of streptomycin per millilitre, while in two growth was much diminished at this level and inhibition was complete in the presence of 10 microgrammes per millilitre. Of six samples from treated patients, two samples contained many organisms which grew in the presence of 1000 microgrammes of streptomycin per millilitre, three contained organisms which resisted 10 microgrammes of streptomycin per millilitre but were inhibited by 100 microgrammes per millilitre, and one sample showed some growth in the presence of one microgramme per millilitre but was completely inhibited by 10 microgrammes per millilitre. There was no correlation between the level of resistance of the organism and the amount of streptomycin the patient had received.

5. The technique and the significance of the results are discussed.

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A SURVEY OF THE INCIDENCE OF INTERDIGITAL FUNGOUS INFECTION IN A GROUP OF STUDENTS FROM THE UNIVERSITY OF OTAGO.

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and
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THE object of this investigation was to discover the incidence of "athlete's foot" among students of the University of Otago. Very few of the students have symptoms of interdigital infection, and it was thought to be desirable to discover how many of them carried a pathogenic fungus, so that a comparison with findings in other parts of the world could be made.

Material and Methods.

The survey was made upon 568 students during the months of February to July, 1948, inclusive. Both sexes were included; all faculties were represented, and ages varied between seventeen and thirty-eight years.

The procedure was as follows. A standard form was filled in which gave relevant particulars. These included age, living quarters, length of time at university, foot hygiene, military service, particulars of residence overseas, and the history of any previously suspected fungous infection of the foot, as well as details of the state of interdigital spaces and associated rashes, if any. Existence of hyperhydrosis was determined partly by the patient's evidence, partly by direct observation; but because of the difficulty of obtaining a definite criterion upon this point, reliance has not been placed upon the findings. For the same reason correlation has not been attempted between maceration and lack of space between the toes, although the impression has been received that the two conditions are closely connected.

Direct examination of the skin from the interdigital spaces (usually the fourth) was made when sufficient material could be obtained without injuring the patient. The standard technique of washing the material in ether and mounting it in caustic potash solution was used. Slides were generally left for two or three hours before examination. A note was made if "mosaic fungus" appeared, but it was not considered evidence of the presence of fungal infection; neither usually were spore-like objects so regarded.

The interdigital spaces were swabbed with methylated spirits, after which scrapings were cultivated on Sabouraud's maltose agar medium; one tube was used per patient. Alcohol swabbing was not done for approximately the first hundred cases. Cultures were kept at room temperature for six weeks before being discarded. When yeasts occurred, subcultures were prepared on cornmeal agar for identification of species. No growths of *Candida albicans* or of *Candida krusei* were obtained, and it was assumed that all other organisms grown were saprophytic non-dermatophytes. Pathogenic fungi grown were examined macroscopically and microscopically, mounted in lacto-phenol cotton blue, in order to determine the species.

Results of the Investigation.

The results of the present investigation can be presented in a number of ways—firstly as to the incidence of infection of the whole group, and then as the incidence is affected by such factors as sex, age, previous history and present living conditions.

Five hundred and sixty-eight students were examined. In 210 the interdigital skin of the toes appeared to be normal, while 358 showed some abnormality. In this abnormal group, 175 showed scaling and 183 definite maceration, in the fourth interdigital space at least.

Seventy-eight subjects were shown to be carrying a fungal infection, seen on direct examination or on culture, or by both methods. Of these, seven had skin which was apparently normal, 23 had scaling interdigital clefts, and 48 had macerated lesions.

Direct examination of the skin was not carried out on every subject; 326 persons were examined in this way, mainly subjects showing some clinical abnormality, and of these 37 or 11·4% were found to be harbouring fungus infection.

Cultures were attempted from every subject examined. Sixty, or 10·6%, resulted in the growth of a pathogenic fungus; 15 of these positive cultures were derived from subjects whose skin had not been examined microscopically, 26 came from subjects who were not found to be harbouring a fungus on direct examination, and 19 confirmed a diagnosis already made on direct examination. Eighteen attempted cultures from subjects yielding positive findings on direct examination failed to grow. The problem of why this failure occurred will be discussed later.

Investigation of the species of pathogen revealed a preponderance of *Trichophyton mentagrophytes*; 49 of the cultures were assigned to this species. Two other species of Trichophyton were represented. Two tubes showed a growth of *Trichophyton rubrum* and one of *Trichophyton violaceum*. The remaining eight cultures showed a growth of *Epidermophyton floccosum*.

Effect of Sex.

One hundred and eighty-seven of the students examined were females; they had a lower incidence of proved fungous infection, only 10 (or 5·9%) giving positive results, although 97 had clinically abnormal interdigital spaces. Three hundred and eighty-two males were examined, 261 showed clinical abnormality and 68 (17·8%) were proved to be carrying a pathogenic fungus. This difference of incidence between the sexes is statistically significant.

Effect of Age.

Analysis of both sexes into age groups showed an increase in incidence of infection with age. The majority of males examined fell between the ages of twenty and twenty-five years. The female group was slightly younger. The percentage giving positive findings in each age group is shown in Table I.

This increase of incidence with age is to some extent due to the inclusion in the group of 151 returned servicemen, most of whom were in the later age groups. Their presence does not appear wholly to account for the increase, as a rise is shown when men without military service are considered alone, and a similar rise occurs among the women. Unfortunately the samples are not sufficiently large to give more than borderline results when the figures are examined statistically, so that further investigations are necessary to discover whether there is any true correlation of incidence with age.

The percentage incidence of infection in males without military service and in females is also shown in Table I.

Effect of Military Service.

When considered as a group, the ex-servicemen presented some interesting features. These men were drawn from all the services, and included subjects who had served

TABLE I.

Type Examined.	Total Males.			Males Without Military Service.			Males with Military Service.			Total Females.		
	Number Examined.	Average Age. (Years.)	Percentage of Positive Findings.	Number Examined.	Average Age. (Years.)	Percentage of Positive Findings.	Number Examined.	Average Age. (Years.)	Percentage of Positive Findings.	Number Examined.	Average Age. (Years.)	Percentage of Positive Findings.
	381		17·8	230	20·9	12·2	151	25·8	26·5	187		5·4
Living in colleges	101	21·1	16·8	88	20·7	17·0	13	24·3	15·4	99	20·0	4·0
Living in lodgings	149	22·9	16·1	81	23·7	9·9	68	25·5	23·6	27	19·9	7·4
Living at home	131	24·6	20·4	61	21·4	8·0	68	26·8	32·4	61	21·4	6·6
Aged 17 to 19 years	63	18·6	9·5	63	18·6	9·5	—	—	—	109	18·3	2·8
Aged 20 to 22 years	148	20·9	14·2	133	20·8	12·8	15	21·9	26·6	55	20·6	5·5
Aged 23 to 25 years	85	23·9	20·0	34	25·7	14·7	61	23·9	23·0	23	26·4	17·4
Aged over 25 years	85	28·6	28·2				75	28·3	29·3			

only a few weeks in a local camp and others who had served throughout the war and in all parts of the world.

One hundred and fifty-one were examined, and 26·5% carried demonstrable fungous infection. This is a significantly greater incidence than found in male students without military service, of whom 230 were examined and 12·2% shown to be carrying a fungous infection.

Analysis of their fields of service showed that 44 had never left New Zealand; these showed 18·2% infection. One hundred and seven had served overseas for varying lengths of time and 29·9% carried a pathogenic fungus. Forty-one men from this group had served in tropical Pacific islands and 41·5% of these were shown to be infected.

Although this group is too small to provide a significant difference, it suggests that men from the Pacific area are carrying a relatively high incidence of fungous infection. Many of them have had recurrent attacks of clinical "athlete's foot" with typical symptoms, although at the time of examination they had no complaints and believed themselves to be free from infection. It is possible that returned soldiers as a whole may act as a reservoir from which the civilian population may become infected. It has not been possible during the present investigation to examine all their immediate contacts, but some such study would be of interest to discover whether the families of these men have become infected.

Table II shows the incidence of infection among these returned servicemen.

TABLE II

Type Examined.	Number Examined.	Average Age. (Years.)	Percentage of Positive Findings.
Males with military service	151	25·8	26·5
Males with military service in New Zealand only	44	24·2	18·2
Males with military service overseas	107	26·6	29·9
Males with military service in the Pacific	41	25·9	41·5
Males with military service overseas, not in the Pacific	66	—	24·2
Males without military service	230	20·9	12·2
Males who have led a corporate life	284	23·6	21·2
Males who have never led a corporate life	97	20·8	7·2

Effect of Living Conditions.

The samples studied from the point of view of living conditions do not show significant differences, but are included because they suggest trends which might be confirmed by further study along these lines.

Most of the returned servicemen were not accommodated in the university colleges, but lived in lodgings or in flats. Therefore the correlation of infection with the varying types of dwellings had to be made with and without this group. When they were included it was found that the incidence was highest among subjects living at home. One hundred and one males lived in colleges and 16·8% were found to be carrying a pathogenic fungus. One hundred and forty-nine men lived in lodgings and they showed a 16·1% incidence. One hundred and thirty-one men lived at home and 20·4% carried demonstrable fungus.

The exclusion of ex-servicemen altered the results considerably. Of the males without military service, 88 lived in lodgings and 9·9% gave positive findings. Sixty-three lived at home and 8·0% showed fungous infection. Thus if no military service was involved the incidence of infection, as would be expected, was considerably higher in males living in colleges than in those in private accommodation. One hundred and one females lived in lodgings or at home, and among them the incidence was 7%. Since the average age of the two groups is approximately the same, this finding is difficult to explain, but may be due to the small number of positive findings among the women as a whole.

Table I includes a summary of these findings.

Effect of Corporate Life of any Kind.

Finally it was possible to divide the male group into those who had lived a corporate life of some kind, and those who, as far as could be ascertained, had lived no form of corporate life. They had not been to boarding school, nor lived in a college, nor served in the armed forces. As would be expected, this group showed a relatively low incidence of infection. Two hundred and eighty-four males had lived some form of corporate life, and 21·5% carried demonstrable infection. Ninety-seven males had lived no form of corporate life and only 7·2% were infected. This is a statistically significant difference.

These figures are also included in Table II.

Discussion.

The results obtained can be discussed from two points of view: firstly, with reference to diagnosis and in comparison with results obtained elsewhere, and secondly, in an attempt to correlate incidence with environmental conditions.

Problems of Diagnosis.

From a survey of the literature and from the experience of the present investigation, it becomes obvious that mycological diagnosis of interdigital fungous infection is far from satisfactory. Various surveys have been made in America and in Australia, and one other in New Zealand, usually on university students or military personnel. Results show considerable variation, but there appears to be a wide discrepancy between clinical abnormality of the skin and mycological confirmation of fungous infection. Some of the earlier workers tended to regard clinical diagnosis alone as sufficient, while others obtained a 90% confirmation by microscopic examination of the skin. Legge, Bonar and Templeton[1] in 1929 examined 3105 freshmen entering the University of California. In their first report they record an incidence of 52·3% among the males and 15·3% amongst females. These figures were based upon clinical evidence; 90% of the findings were confirmed microscopically, but only 5% or 6% of subjects yielded positive cultural findings. In a later report[2] in the same year, 1000 males and 997 females were examined at the end of the spring semester; 78·6% of the males, but only 17·3% of the females, showed clinical manifestations of "athlete's foot". (The differing rate of increase was attributed to the use of a new gymnasium by the women, an old one by the men.) Since this microscopic confirmation is not reported in recent investigations, it seems possible that at that time the artefact "mosaic fungus" was regarded as true evidence of infection. Weidman[3] drew attention to "mosaic fungus" in 1927 and suggested that it might be due to disintegrating mycelium; but by 1935 Davidson and Gregory[4] had shown that the appearance was an artefact due to the precipitation of cholesterol crystals.

Further studies give the incidence of clinical "athlete's foot" in various communities, with or without laboratory confirmation of fungous infection. In 1925 Hulsey and Jordan[5] carried out a survey on 100 male students of the University of Pennsylvania. They found that 67 of their subjects gave clinically positive findings and 10 dubious results; skin from these 77 was examined microscopically, and 47 were found to be harbouring fungous infection. Cultures were attempted from these subjects, but only five showed growth of a pathogenic fungus.

In 1935 Gould[6] stated that a survey of 35 universities in America showed an incidence of 50% to 90% infection in males and 14% to 40% in females; but he gave no information concerning the methods used and no definite figures were quoted. A further survey was carried out in the University of Pennsylvania by Gilman.[7] He found gross evidence of *Tinea interdigitalis* in 60% of 500 males, and in 57% of 285 females. No figures were given for results other than clinical examination. He appears to have had difficulty in demonstrating the presence of a pathogenic fungus, for he states: "We found, too, that sweating had a marked deterrent effect, not on the causation of the ringworm, but on the laboratory confirmation of what was an apparent bona fide clinical type."

TABLE III.

Summary of Investigations upon the Incidence of Athlete's Foot.

Year and Place of Investigation.	Authority.	Clinically Suspect.		Confirmed Microscopically.		Pathogenic Fungus Grown.		Fungus Present.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
1925, University of Pennsylvania..	Hulsey and Jordan.	67%	—	47%	—	5%	—	47%	—
1929, University of California ..	Legge, Bonar and Templeton.	52¼%	15½%	90% of those suspect.		5% to 6% of suspects.		90% of suspects.	
1929, University of California ..	Legge, Bonar and Templeton.	78·6%	17·3%	—	—	—	—	—	—
1931, United States of America	Gould.	50% to 90%	14% to 40%	—	—	—	—	—	—
1933, University of Pennsylvania	Gilman.	60%	57%	—	—	—	—	—	—
1936, New Orleans	Howles.	86% to 96%	—	—	—	8% to 10%	—	8% to 10%	
1939, Sydney	Kesteven.	—	—	—	—	—	—	38%	
1941, Australia	Linn and Margarey.	71·1%	—	1·1%	—	0·6%	—	1·7%	—
1943, New Zealand	Matthews.	63·0%	20·7%	8·9%	0·0%	—	—	8·9%	0·0%
1944, Great Britain	Phillips.	7·4%	15·8%	2·89%	6·0%	—	—	2·89%	6·0%
1945, United States of America ..	Broyles *et alii*.	59·9%	—	17·7%	—	2·4%	—	18·1%	—
1948, University of Otago ..	Marples and di Menna.	68·5%	51·9%	15·2%	2·9%	13·6%	4·3%	17·8%	5·4%

Howles[8] in 1936 published the results of a survey made in a New Orleans penitentiary. He found an 86·5% incidence of maceration on admission to the penitentiary and a 96·1% incidence among the inmates. In spite of this high proportion of clinical cases, pathogenic fungi were grown from only 10% of the subjects examined.

In 1945 Broyles *et alii*[9] examined 871 men entering the United States Naval Academy at Annapolis. One slide for direct examination and one culture on Sabouraud agar medium were prepared from each subject; 59·9% of the subjects had clinical evidence of *Tinea pedis*, of which less than half were aware; 154 direct examinations gave positive results. Cultures were kept at 30° C. for three weeks; 21 showed growth of a pathogenic fungus, four being derived from subjects whose skin gave negative findings on direct examination. In 14 instances the pathogen was *Trichophyton mentagrophytes* and in seven *Trichophyton rubrum*.

These American findings indicate a clinical incidence very similar to that found in the present investigation, and the number of positive mycological findings agrees with the present series in being considerably less than would be expected from the clinical situation. The only similar British survey available was that of Phillips.[10] The paper deals essentially with the evaluation of the camphor-phenol treatment, but it includes the results of examination of 3250 soldiers and 500 women. Of these men, 243 (7·47%) were clinically suspected of *Tinea pedis*, but in only 2·89% of instances was the condition microscopically confirmed. Of the women, 79, or 15·8%, were clinically suspect, and 6·0% yielded microscopic confirmation. No cultures were made. These results differ from the majority of findings, including those of the present investigation, in revealing a greater incidence in females than in males. Results of Australasian investigations present the same anomalies. In 1939 Kesteven[11] noted a 38% incidence of "surfer's foot" amongst applicants for work at Goodyear's factory in Sydney. He could find no correlation between its presence and surf-bathing. He gives no separate figures for clinical abnormality. He used two methods of microscopic preparation for direct examination, one the clove-oil, picric-acid method, the other a modification of that of Berberian. Mosaic was not regarded as evidence of infection. Cultures were made on Sabouraud medium. Since this is a higher proportion of laboratory diagnosis than is often found, it would be interesting to know to what extent it coincided with clinical signs of infection.

Linn and Magarey[12] made another Australian survey in 1941. This was carried out in a military camp, and included 650 men. Of these, 462 were found to have some abnormality of the interdigital skin; 256 showed scaling, the rest maceration and fissures. A clinical diagnosis was made in 251 cases, but microscopic confirmation was found in only six. In addition in one doubtful case microscopic evidence of fungus was found. These examinations were made on skin treated with caustic potash. Cultures were made on Sabouraud agar medium, but only four grew a pathogenic fungus and none of these were from subjects who gave positive findings on direct examination. The cultures were discarded after ten days, and it seems likely that more pathogens would have been obtained had they been kept longer. In the present investigation it was found that small samples of skin might not produce a recognizable growth of Trichophyton until ten to fourteen days after inoculation, and that cultures of Epidermophyton did not appear for three weeks. Linn and Magarey, however, suggested that failure to grow was due to treatment. They also put forward the widely held view that an ætiological factor of maceration was low-grade bacterial infection, associated with and aggravated by hyperhydrosis.

In New Zealand, Matthews[13] in 1943 made a thorough examination of 2008 subjects at Trentham Military Camp. Owing to inadequate facilities, only clinical and microscopic examinations were made, but these were exhaustive. Four specimens of skin were taken from each subject. Spores and "mosaic" were not regarded as positive evidence of infection. Of those examined, 63% showed clinical abnormalities of interdigital skin, and 8·9% were found to give positive results on direct examination. None of the 174 women included in the survey were proved to have a fungous infection. The confirmation by direct examination obtained by Matthews is comparable to that of the present investigation, in which 11·4% of the direct examinations showed the presence of a fungus.

When the results of all these studies are taken into account, the evidence is strong that clinical interdigital abnormality cannot be shown in a large number of cases to be due to demonstrable fungus. There are several possible explanations for this result. Many authorities have suggested that the discrepancy is due to bacterial infections. It was not possible during the present investigation to make an adequate study of the bacterial flora of the interdigital spaces, so that no evidence on this matter can be offered in the present report.

Effects of treatment and hyperhydrosis have also been suggested as possible explanations. One of the aims of the present investigation was to discover whether interdigital scaling could be due to purely mechanical conditions—that is, whether owing to moisture and pressure normal desquamation did not occur, and the skin separated in large flakes. The answer to this question has not been obtained, since it soon became obvious that the current methods of diagnosis were not wholly satisfactory, and that it was impossible to be sure that cases of scaling and maceration, in which findings were negative on both direct and cultural examination, were not due to fungous infection.

Evidence is also offered in the present report that pathogenic fungus may be demonstrated in interdigital skin which shows no clinical abnormality, since samples from seven apparently normal subjects yielded positive cultures. This finding, which confirms that of other workers, shows that the pathogen can be present in the skin without any clinical signs. Whether these subjects were in the process of becoming infected, so that samples were taken before the skin had had time to show a reaction, is an interesting speculation.

When clinical diagnosis can be confirmed by laboratory findings, further difficulties arise. The first is the problem of why direct examination often gives negative findings when a positive culture is subsequently obtained. In this survey, 26 positive cultures came from skin, samples of which had yielded negative findings on direct examination, and only 19 from samples yielding positive findings on direct examination. During the present investigation, repeated attempts were made to find fungus on direct examination of the skin from subjects who regularly yielded positive cultural findings. These were by no means always successful, negative results being encountered whether samples were taken from the edge of the lesion, from the edge of fissures, or as thick pieces of macerated skin. In a recent paper Weidman and Glass[14] stress the importance of taking samples correctly and in large quantities and in making "repeat" cultures. They worked on inmates of a penitentiary and found that their positive results were increased by more than 5% by making "repeat" cultures from the "negative" subjects. It seems possible that active fungus is distributed in localized areas, possibly deeper than the surface of the skin, and that repeated attempts to demonstrate its presence should be made before the findings can be regarded as negative.

The second problem requiring explanation is why subjects who show positive evidence of infection on direct examination fail to yield positive cultural results. This finding has also been obtained by several authorities, and although in the present investigation a larger number of positive cultures were obtained than in many of the series cited, yet material from 18 of the subjects who gave positive findings on direct examination failed to yield a growth of fungi. Material from six of them yielded a growth of non-pathogenic fungal contaminants, and since these grow much more rapidly than pathogenic fungi, the failure in these cases is easily explained. The remaining twelve may be accounted for in a number of ways. (i) There may have been an error in the direct examination. This does not seem a satisfactory explanation, since only specimens which contained numerous branching hyphæ were regarded as "positive", and these when present are easy to recognize. (ii) The negative results may be due to the patchiness of the fungus, already postulated, so that by chance the pieces of skin planted on the medium were free from fungal elements. (iii) A third possibility which may offer some explanation became obvious during the investigation. A number of the tubes inoculated were contaminated by bacterial growth. If this was due to staphylococci or the majority of skin organisms, the fungus would also grow, and could be obtained in a pure form by subculture. But if the contaminant was *Bacillus subtilis* or *Bacillus pyocyaneus* no growth of fungus appeared. These organisms are known to produce bacteriostatic and fungistatic substances. If both a pathogenic fungus and these organisms were inoculated simultaneously, the more rapid bacterial growth would result in the production of fungistatic substances, which might thus inhibit the growth of the fungus and account for the failure to obtain a culture.

This finding was confirmed by inoculating a plate of Sabouraud agar with a suspension of *Trichophyton mentagrophytes* by the pour-plate method, so that the fungus was evenly distributed. As soon as the medium set, cultures of *Bacillus pyocyaneus* or *Bacillus subtilis* were inoculated in localized areas. Zones of inhibition of the fungus became obvious in seven to ten days.

The further investigation of the methods of diagnosis of fungal interdigital infection is planned for the immediate future, material from a group of known "positive" subjects to be used.

Problems Arising out of the Study of Environmental Conditions.

Any conclusions drawn in connexion with the study of environmental conditions can be only tentative, since the samples taken were too small to be satisfactory from a statistical point of view. They appear, however, to be worth discussing, since they suggest possible correlations which could be followed up in further studies.

The first result which appears of interest is the possible increase of fungous infections with age. Henrici,[14b] in his presidential address on "Characteristics of Fungus Diseases" to the Society of American Bacteriologists in 1939, stresses the importance of repeated inoculation in the development of fungous infections. He also suggests that an allergic response plays a part in the development of symptoms in both superficial and deep mycoses. It is conceivable that the reason for the increase of incidence of infection with age may be the fact that repeated inoculation is necessary, so that sensitization may be produced before the fungus can become implanted in the interdigital spaces. It is known that interdigital infection may be accompanied by dermatophytid rashes in other parts of the body. This may possibly represent a further development of the process of sensitization, which at first is localized and later becomes generalized.

It would seem desirable to examine age groups on either side of those included in the present investigation, in order to find out whether Henrici's further suggestion that repeated inoculation and sensitization finally lead to immunity is correct when applied to the occurrence of interdigital fungous infection.

It has been stated by all authorities that interdigital fungous infection is spread, among people living a corporate life, in showers, bathrooms, dresing rooms *et cetera*. The present investigation confirms the finding that the fungus is spread where individuals are living together in large groups. The large proportion of ex-servicemen with demonstrable infection bears out the widespread finding that these infections spread readily during the war years, presumably because of the difficulty of maintaining adequate hygiene during certain phases of the war. The possibility is that these men may act as a reservoir from which infection may spread to the general public.

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B.C.G. VACCINATION AGAINST TUBERCULOSIS.

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TUBERCULOSIS still kills more people in the young adult age groups than any other disease, although the death rate from it has been falling steadily for many years. This decreased mortality is due to the fact that fewer persons are now developing tuberculosis—not because the prognosis of the established disease has been greatly improved over the past few decades (Lewis, 1948; Burnet, 1948). Prevention, then, must continue to play a major role in tuberculosis control.

Preventive measures may be considered under two headings: (*a*) non-specific; (*b*) specific.

Non-specific preventive measures include such matters as improved living and working conditions, especially better housing and diet. They will not be further considered here, although it is obvious that they have been largely responsible for the decline in incidence and mortality.

Specific preventive measures are based on the fact that tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. They aim at (*a*) preventing the spread of the causative organism, especially by control of the "sputum-positive" case and (*b*) building up a specific immunity against *Mycobacterium tuberculosis*.

Since Koch discovered the tubercle bacillus in 1882 many attempts have been made to produce an effective vaccine against it. So far the only one that has given any substantial measure of success is the live vaccine prepared from B.C.G. (*Bacille Calmette-Guérin*). About 1908 Calmette and Guérin commenced to attenuate a strain of *Mycobacterium tuberculosis* isolated from the udder of a tuberculous cow. After more than 200 successive passages on bile-potato medium and many animal experiments, it was tested in man (Calmette and Guérin, 1920; Calmette *et alii*, 1921, 1922, 1924; Calmette, 1927), and in July, 1921, Weill-Hallé administered it orally to an infant of a tuberculous parent. It has been in constant use since then.

B.C.G. vaccine produces a mild self-limiting tuberculous infection at the site of inoculation and induces a rapid change from "tuberculin-negative" to "tuberculin-positive" status. A positive reaction to tuberculin is a manifestation of allergy due to past infection with *Mycobacterium tuberculosis*. Allergy is not identical with immunity but tends to run parallel with it in those who have overcome a naturally acquired infection (Heimbeck, 1936; Prophit survey, 1948).

It is generally recognized, however, that it is too dangerous to allow persons, especially infants and young adults, to acquire their specific immunity in this haphazard way—too many develop genuine tuberculosis. It is claimed by its advocates that B.C.G. will produce a similar degree of immunity but without the attendant risk. There is much to support this claim.

In spite of the Lubeck tragedy, which was subsequently proved to be due to gross carelessness in confusing a virulent human strain kept in the same incubator as the B.C.G. culture, B.C.G. vaccine may now be said to be entirely safe when prepared and used under proper conditions (Tytler, 1947; Levine, 1947).

Efficacy of B.C.G. Vaccination.

Apart from the results of animal experimentation, evidence for the efficacy of B.C.G. rests on the clinical experience of many able and honest clinicians, especially in Scandinavia, and on the results of special studies, progress reports of which are still coming to hand. It is, of course, realized that the difficulties of assessing the value of any one preventive measure against tuberculosis are very great. A special difficulty is the chronicity of the disease. However, most of the studies have been in progress for ten years or more and the results of all are favourable to B.C.G.

These studies have been carried out on three main groups of persons: (*a*) student nurses and other hospital personnel; (*b*) infants and young children, including "contact" and "non-contact" study groups in slum areas; (*c*) primitive peoples—North American Indians, who are particularly susceptible to tuberculosis.

Heimbeck (1936) was the first to show that student nurses who were "tuberculin-positive" when they commenced training were less liable to tuberculosis whilst at the hospital than were those initially "tuberculin-negative". Now he has shown that B.C.G. immunization has significantly lessened the morbidity and mortality rate of those originally "tuberculin-negative" (Heimbeck, 1947). (See Table I.)

Further, it would appear that the protection afforded by B.C.G. is not just a temporary one (see Table II). Heimbeck has followed up the members of the different groups after their training was completed and has found that the vaccinated were no more liable to succumb later than were those who had acquired their immunity by

TABLE I.
Tuberculosis in Oslo Nurses During Training (Heimbeck 1947).

Group.	Number.	Observation Years.	Ill.	Dead.	Morbidity per Thousand Observation Years.	Mortality per Thousand Observation Years.
(*a*) Pirquet-positive	668	1772	22	0	12·4	0
(*b*) Pirquet-negative, B.C.G. given[1]	501	1450	35	3	24·1	2·1
(*c*) Pirquet-negative, no B.C.G. given[1] ..	284	687	97	10	141·2	14·6

[1] Morbidity: B.C.G. (*b*) versus no B.C.G. (*c*), $P<0·001$.
Mortality: B.C.G. (*b*) versus no B.C.G. (*c*), $P=0·005$.

TABLE II.

Tuberculosis in Oslo Nurses after Training (Heimbeck 1947).

Original Group.	Number.	Observation Years.	Ill.	Dead.	Morbidity per Thousand Observation Years.	Mortality per Thousand Observation Years.
Pirquet-positive	504	4792	13	1	2·7	0·2
Pirquet-negative, B.C.G. given	377	3318	7	2	2·1	0·6
Pirquet-negative, no B.C.G. given	178	1610	8	2	5·0	1·2

accidental infection. The infection rate at the Ulleval Hospital was so high that all nurses, including the unvaccinated, were "von Pirquet-positive" when they had finished their training.

Ferguson's results (Ferguson, 1946) are summarized in Table III.

The differences in morbidity between the vaccinated and non-vaccinated groups are statistically significant for personnel of both general hospitals and tuberculosis sanatoria. Ferguson's work has been criticized by Wilson (1947) on the ground that the groups are not strictly comparable. However, special precautions were taken to avoid possible error and unintentional bias and in any case Ferguson's results are in complete accord with those of Heimbeck.

Studies of B.C.G. vaccination of infants and young children include those of Rosenthal (1948*a*) and his colleagues in Chicago, Levine and Sackett (1946), and Levine (1947) in New York, and those of Ferguson and Simes (1949) in Saskatchewan and of Aronson (1948) in Indian reservations in the United States of America.

Rosenthal's study groups included both "contact" and "non-contact" groups in slum areas of Chicago (Table IV). It is known that infants are particularly liable to infection from tuberculous mothers. Therefore, in accordance with a generally accepted principle, Rosenthal temporarily separated both vaccinated and controls from their parents.

Levine and Sackett's experience with "contact" cases in New York (Table V) in which this temporary breaking of contact was not practised is illuminating. In the earlier period the infants of parents who consented to have their babies immunized were vaccinated. Those whose parents objected were used as controls. The results appeared to favour B.C.G. Later, when the method of selection was altered so that only alternate infants, whose parents consented, received B.C.G., vaccination gave no apparent protection. Recently, however Levine (1947) adopted the principle of temporarily breaking the contact prior to and after vaccination, with results comparable with those of Rosenthal's "contact" group (Table VI).

Both Ferguson and Simes's and Aronson's studies are being carried out on North American Indian infants in Indian reservations in Saskatchewan and the United States of America respectively (Table VII). Their results are remarkably similar.

Aronson's (1948) latest published result of the study of B.C.G. vaccination of young "Mantoux-negative" American Indians, between the ages of one year and twenty years, is conclusive (Table VIII). The only criticism of the earlier results of this study (Aronson and Palmer, 1946) by Wilson (1947) was whether "such spectacular results could be expected in civilized peoples". The answer to this comes from Norway where Hertzberg (1948) analyses the results of B.C.G. vaccination in the Oslo Tuberculosis Dispensaries (Table IX). The results are remarkable.

During a recent trip abroad I had the privilege of meeting all the workers just referred to, with the exception of Levine, and found them all serious scientific investigators anxious to arrive at the truth. Altogether it may be said that the case for B.C.G. is now much stronger than it was when Wilson (1947) severely questioned its value (Levine, 1947; Aronson, 1948; Rosenthal, 1948*a*; Hertzberg, 1948; Heimbeck, 1947; Ferguson and Simes, 1949; Wallgren, 1948).

It cannot, however, be to strongly emphasized that B.C.G. vaccination should not be used as an alternative to measures such as early case finding and control of the "sputum-positive" cases, but rather as an additional weapon.

Preparation of B.C.G. Vaccine.

The importance of the antigenicity of the vaccine (*The Lancet*, 1948) can be only briefly referred to. It depends mainly on the viability of the bacilli in it. This depends on methods of culture and preparation of the vaccine and on its proper storage and early use after it is prepared.

Stringent precautions are taken in modern B.C.G. laboratories to see that the vaccine is not contaminated by virulent *Mycobacterium tuberculosis* or other pathogens.

A fresh liquid vaccine remains fully potent for only about ten days from the time it is prepared, even when stored at 2° to 4° C. Preliminary work carried out at the Commonwealth Serum Laboratories indicates that the vaccine may remain potent for some months if it is rapidly frozen immediately after preparation and stored in dry ice. All of a small series of persons inoculated with vaccine preserved in this way for three months subsequently became "Mantoux-positive".

Freeze-drying of the vaccine in 50% glucose solution (Leshchinskaya, 1946; Birkhaug, 1947, 1948) and in 15% lactose solution (Rosenthal 1948*b*) has also met with some success, but there are still difficulties to be overcome.

There is no international standard for B.C.G. vaccine and the assay is essentially a clinical one. The dose to be aimed at is one that will give almost 100% of "Mantoux-conversions" with only mild reactions at the site of injection of the vaccine.

The vaccine prepared at the Commonwealth Serum Laboratories is suitable for intradermal injection only. The dose recommended for all but newborn infants is 0·1 millilitre given in the deltoid region or lateral aspect of the thigh. No other site should be used.

TABLE III.

B.C.G. Vaccination of Nurses and Other Workers in Hospitals and Sanatoria (Ferguson 1946).

Source of Study Group.	Subgroup.	Number of Persons.	Cases of Tuberculosis.	Percentage with Tuberculosis.	Average Years Observed.
Nurses in Saskatchewan hospitals and Winnipeg General Hospital combined	B.C.G. vaccinated	1005	9	0·895	2·42
	Mantoux-negative on entrance, no B.C.G. ..	1368	55	4·02	2·43
	Mantoux-positive on entrance	478	5	1·046	2·43
Exposed employees, including nurses in Saskatchewan sanatoria.	B.C.G. vaccinated	470	9	1·92	1·19
	Mantoux-negative on entrance, no B.C.G. ..	274	32	11·67	1·44
	Mantoux-positive on entrance	462	13	2·81	1·44

Differences between vaccinated and non-vaccinated groups statistically significant.

Persons Likely to Benefit from B.C.G. Vaccination.

As already indicated, only persons who are non-reactors to tuberculin, and who are therefore judged to be lacking a specific immunity from a previous infection, can benefit from B.C.G. vaccination. As Professor Wallgren puts it, B.C.G. cannot be expected to give a better protection than a natural infection successfully overcome. It is recognized that in civilized communities "tuberculin-negative"

TABLE IV.

Latest Progress Report on Chicago Infants (Rosenthal, 1948).

Group.	Subgroup.	Number of Children.[1]	Number of Cases of Tuberculosis.	Number of Tuberculosis Deaths.
Non-contact[1] ..	Vaccinated	1400	11	1
	Control ..	1400	39	7
Contact	Vaccinated	151	2	0
	Control ..	105	5	4
Combined contact and non-contact	Vaccinated	1550	13	1
	Control ..	1500	44	11

[1] For the "non-contact" group Rosenthal gives approximate numbers only.

nursing, medical and dental students *et cetera* and very young children in infected households are particularly liable to contract manifest tuberculosis.

The National Health and Medical Research Council has therefore recommended that, in the initial stages, immunization in Australia should be confined to such groups. Later, as practitioners become more conversant with the necessary procedure, its use may be extended, as has

TABLE V.

B.C.G. Vaccination of New York Infants (Levine and Sackett 1946).

Period.	Alternate Selection.	Vaccinated.		Control.	
		Number.	Deaths from Tuberculosis.	Number.	Deaths from Tuberculosis.
1926–32	No.	445	3	545	18
1933–44	Yes.	566	8	528	8

been the case in Scandinavia. As it would be harmful to the eventual widespread use of this preventive measure if mistakes in the procedure and in the technique of applying the vaccine were made, particularly in the early stages, the Council has further recommended that its use should be controlled by the Health Departments of the different States.

TABLE VI.

Exposed Subjects Separated Three Months Before and Three Months After being Vaccinated or Used as Controls (Levine 1947).

	Number of Exposed Subjects.	Deaths from Tuberculosis.
Vaccinated	91	1[1]
Controls	96	3

[1] Patient died at age of three months, and therefore presumably should not be included.

Persons Who Should Not be Vaccinated.

If those allergic to tuberculo-protein are vaccinated they may develop a Koch phenomenon at the site of injection. This consists of a severe inflammatory reaction a day or two after inoculation, followed by necrosis and sloughing with the formation of an ulcer that heals slowly. No permanent harm will result, but B.C.G. vaccination will be discredited.

In spite of precautions a person in the incubation stage of tuberculosis, when all signs including a positive tuberculin reaction are still absent, will occasionally be vaccinated. This will not harm him, but B.C.G. may actually be blamed for the ensuing disease if the patient is not warned of the possibility before vaccination.

Technique of "Screening", Vaccination and "Follow-up".

As the object of B.C.G. immunization is to convert persons from "tuberculin-negative" to "tuberculin-positive" status, it follows that careful tuberculin testing is essential to success. The Mantoux has at least two definite advantages over other tests, such as the von Pirquet, the Moro and the Volmer: (*a*) it is quantitative, and (*b*) the tuberculin is applied in the same quantity (0·1 millilitre) and in the same manner (intradermally) as is the B.C.G. vaccine.

TABLE VII.

B.C.G. Vaccination of American Indian Infants in Saskatchewan (Ferguson and Simes 1949) and United States of America (Aronson 1948).

Group.	Subgroup.	Number of Infants.	Period of Study. (Years.)	Number of Deaths from Tuberculosis.
Saskatchewan (Ferguson)	Vaccinated	306	Up to 14	2
	Control ..	303	Up to 14	9
U.S.A. (Aronson)	Vaccinated	123	6 to 8	0
	Control ..	139	6 to 8	4

Either old tuberculin (O.T.) or the purified protein derivative (P.P.D.) may be used for the Mantoux testing. Because it is cheaper, more easily procurable, and quite reliable when properly used, O.T. is recommended as a routine agent.

All experienced B.C.G. workers recognize the necessity for standardization of the Mantoux test used in the preliminary "screening" and for retesting after vaccination. Dr. R. G. Ferguson, of Saskatchewan, Canada, found it safe and, for administrative reasons, convenient to test nurses before and after vaccination with 0·1 millilitre of 1:1000 old tuberculin (O.T.). The use of a single dose simplifies procedure. Some who do not react to 1:1000 would react if tested with 1:100 O.T. In practice, however, he found that the larger dose was not necessary and considered that in any case such a mild degree of allergy indicated only a weak or waning immunity that might need reinforcing.

The procedure recommended when hospital personnel are immunized in Australia is set out in Table X. It is based largely on Dr. Ferguson's experience and on that of Dr. Konrad Birkhaug, B.C.G. expert of the Division of Laboratories and Research in New York State. Points

TABLE VIII.

Progressive Results of B.C.G. Vaccination of American Indian Children and Young Adults (Aronson and Palmer 1946, Aronson 1948).

Groups Originally Tuberculin-Negative.	Number in Group.	Period of Study. (Years.)	Number of Deaths from Tuberculosis.
Vaccinated	1550	6	4
		8 to 9	6[1]
Non-vaccinated	1457	6	28
		8 to 9	52[1]

[1] Mortality: B.C.G. vaccinated versus non-vaccinated controls, $P < 0{\cdot}00001$.

that need to be specially stressed, perhaps, are as follows. (*a*) The criterion of a positive result from a Mantoux test is infiltration after at least forty-eight hours at the site of injection; erythema alone should be disregarded. (*b*) B.C.G. vaccine should be injected intradermally, slowly and with great care, otherwise unduly large abscesses are likely to develop. (*c*) The vaccine used should be as fresh as possible and suitably stored before

TABLE IX.

Results of B.C.G. Vaccination in City of Oslo—Based on Some Thousands of Case Histories (Hertzberg 1948).

Disease Group.	Nature of Lesions.	Morbidity.[1]		Mortality.[1]	
		Vaccinated.	Controls.	Vaccinated.	Controls.
A	Primary tuberculosis lesions	1	137		
B	Tuberculosis of the glands, skin and soft tissues	1	6		
C	Pleurisy, pulmonary infiltration and tuberculosis of bones, joints and eyes	1	9		
D	Tuberculous meningitis, miliary tuberculosis and destructive pulmonary tuberculosis	1	27		
D	Destructive pulmonary tuberculosis alone	1	21		
Combined	All forms	1	23	1	45

[1] Figures for morbidity and mortality are proportions, not actual numbers.

use. (*d*) Its batch number must be recorded, so that possible complaints regarding its safety can be answered with certainty.

Infants may be presumed to be free from tuberculosis when born. If, therefore, a baby is removed from the tuberculous parent at birth, it may be vaccinated without a preliminary tuberculin test. It is more difficult to convert newborn infants to "tuberculin-positive" status than it is to convert older children and adults. The dose of vaccine should therefore be increased to 0·2 millilitre given in two injections each of 0·1 millilitre at sites about one inch apart. Infants should not be returned to the infectious environment until "Mantoux-positive".

TABLE X.

Procedure for Immunization of Hospital Personnel—Nursing Staff, Medical Students et cetera.

Procedure.	Additional Details.
Mantoux test on entrance with 1:1000 old tuberculin (O.T.).	Standard test as criterion for vaccination fundamental. Area of œdema at least 5·0 millimetres in diameter after 48 to 72 hours is evidence of positive result.
X-ray examination of chest.	Useful as basis for future comparison and record.
Vaccinate immediately, on voluntary basis, if "Mantoux-negative".	Inject 0·1 millilitre fresh B.C.G. vaccine intradermally and slowly in deltoid region or thigh. If injection too deep, complications are likely to occur.
Examine site of injection 4 weeks after vaccination.	Note evidence of "take". If discharging, use dry dressing only. Do not keep out air.
Repeat Mantoux test 6 to 8 weeks after B.C.G. with 1:1000 O.T.	If still "Mantoux-negative" 8 weeks after B.C.G. inoculation, revaccinate.
Nurses may remain on duty throughout, but not in tuberculosis wards.	Infection rate in general hospitals perhaps 1% per month, so risk small during short time immunity takes to develop.
X-ray examination at six-monthly and Mantoux test at twelve-monthly intervals whilst at hospital.	Careful "follow-up" is essential part of procedure. Revaccinate any that revert to "Mantoux-negative" status.
Keep full records on special cards (Tb. C3) provided, including batch number of vaccine.	Accurate records necessary for evaluating results. Batch number necessary if accusations are made against B.C.G.

0·1 millilitre of 1:1000 old tuberculin or 0·0002 milligramme of P.P.D. (purified protein derivative) is equivalent to 10 tuberculin units.

When vaccination of children (other than newborn infants) living in tuberculous households is contemplated, the procedure for vaccinating nurses (see Table X) should be modified as follows. Contact with the source of infection must first be broken. A child under the age of ten years should then be tested with 1:10,000 old tuberculin, or by the Volmer patch method. If the child does not react he should then be tested with 1:1000 O.T. Those ten years of age or over may, however, be immediately Mantoux tested with 1:1000 O.T.

Vaccination should not be carried out unless the result of a further Mantoux test with 1:1000 O.T., six weeks after contact was broken, is also negative. This delay lessens the possibility of vaccinating the child in the incubation period (Levine, 1947; Wallgren, 1948). As already pointed out, vaccination during this period will cause no harm to the child, but will tend to discredit B.C.G. vaccination. Contact with the source of infection should not be resumed until the child is "Mantoux-positive". This may take three months or even more.

Summary.

1. B.C.G. vaccination is a means of raising the specific immunity against tuberculosis in persons who have not previously been infected as judged by a tuberculin skin test.

2. B.C.G. vaccination is perfectly safe when properly carried out with a reliable vaccine. It produces a mild self-limiting infection at the site of inoculation.

3. Evidence for the efficacy of B.C.G. vaccination rests on clinical experience and on the favourable results of long-term carefully planned studies. In many of these studies the difference between the morbidity and mortality rates of the vaccinated as compared with those of the controls is statistically significant.

4. Only those who are non-reactors to the Mantoux test with ten tuberculin units (0·1 millilitre of 1:1000 O.T.) should be vaccinated.

5. B.C.G. vaccine is a live vaccine and deteriorates rapidly. It must be used within ten days of its preparation, and then only if it has been stored in the cold prior to use.

6. Owing to special difficulties associated with B.C.G. vaccination and as a result of the experience of overseas authorities, the National Health and Medical Research Council has recommended that, in the initial stages, B.C.G. vaccine should be issued only to State Health Departments for vaccination under their control of hospital personnel and children in infected households.

7. The procedure to be adopted for vaccination of (*a*) students, nurses *et cetera*, (*b*) newborn infants of tuberculous parents, and (*c*) other children in infected households is outlined, and the necessity for careful Mantoux testing and injection of vaccine is stressed.

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Reports of Cases.

EHLERS-DANLOS SYNDROME IN A CHILD OF SIX YEARS.

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IN 1901 Ehlers described a syndrome of laxity of the skin with a tendency to hæmorrhage, associated with laxity of the joints. In 1907 Cohn gave a description of circumscribed changes occurring in the skin in such a case; and in 1908 Danlos described a syndrome of laxity of the skin with tumours about the elbows and knees resulting from chronic contusions.

Ronchese, in 1936,[a] reviewed the total published cases, which then numbered twenty-seven. At the present time the total number is less than fifty cases.

The syndrome is characterized by three main features: (i) dermatorrhexis, or fragility of the skin and blood vessels, with breaking, splitting and the formation of hæmatomata, pseudotumours, and subcutaneous spherules, subsequent to the slightest trauma; (ii) arthrochalasia, that is, hyperlaxity and hyperelasticity of the joints, so that the subject may assume grotesque contortions of the limbs with apparent ease; (iii) dermatochalasia, which is hyperlaxity and hyperelasticity of the skin, so that it may be stretched and drawn out like india-rubber—this feature and that of arthrochalasia have led to the inclusion of these patients in circuses and side-shows as "india-rubber people".

Patients complain of the great vulnerability and fragility of the skin, which tends to split with the slightest trauma, and if it is stitched the sutures readily tear out, the application of adhesive strapping being the most successful method of approximating the wound edges.

A marked facial similarity has been noted in patients with this syndrome—the face is round, with prominent widely-spaced eyes (see Figure I). Subcutaneous fat is scanty, and atrophic, papyraceous scars occur. Characteristic features are the presence of mobile, subcutaneous, fatty spherules, and molluscoid or raisin-like pseudotumours over the bony prominences.

The syndrome is of equal distribution between the sexes, and there is frequently a family history; Coe and Silvers presented four generations in one family with the condition.

The ætiology is unknown, but there is believed to be a congenital dysplasia of the mesenchyme; all other ectodermal derivatives, such as hair, teeth and nails, are normal.

A biopsy of the skin shows wrinkling of the epidermis due to hyperplasia of the elastic fibres, which form a dense network extending into the mid-cutis and replacing papillary bodies, collagen fibres and subcutaneous fat.

FIGURE I.
Photograph to illustrate typical facies, lax, sagging cheeks and widely-spaced prominent eyes.

The use of Weigert's elastic tissue stain shows strikingly how the elastic fibres extend into the epidermis between the basal cells; this hyperelastosis is apparently a developmental anomaly.

With slight trauma, the epidermis splits and gapes owing to the contraction of the hypertrophied elastic fibres, which separate the edges as if forcibly pulled apart; this phenomenon is accelerated by a decrease in the collagen fibres, which normally inerease the tensile strength of the skin and resist stretching.

The papyraceous scars are due to the poverty of fibroblasts and collagen fibre bundles; the molluscoid pseudotumours are on section very similar in appearance to cavernous angiomata, and are indeed due to extravasations of blood into the lax subcutaneous tissues following trauma.

Subcutaneous spherules are due to a deviation from normal in the growth of fat, there being bud-like processes arising from small nodules in the subcutaneous fat; these may in time break down to become minute, oil-containing cysts, with thick fibrous or even calcified walls, which give a characteristic radiographic appearance.

The muscle fibres and blood vessels are histologically normal.

Clinical Record.

Margaret P., aged six years, a child of normal parents, and the eldest of four normal siblings, was brought to me

complaining that, on every occasion that she suffered the slightest trauma to her limbs, such as falling on to the carpet or brushing her arms against a bush, her skin would split and evert, exposing the subcutaneous tissues, and that, if stitches were inserted, they pulled away and the wounds had to be strapped with adhesive plaster to secure approximation of the edges. The child had been born two weeks before the date of her expected birth; her birth weight, however, was 7 pounds 7 ounces, and she had been breast fed for nine months; there was no history of previous illness.

On examination, the child had the typical facies with widely-spaced eyes; the skin was soft and velvety to the touch and could be drawn out like india-rubber (see Figure II). The joints, particularly those of the fingers and toes, showed abnormal laxity. The knees were covered with atrophic, red, papyraceous scars; there was a large linear

FIGURE II.

Photograph to illustrate hyperlaxity of skin, also disfiguring papyraceous scars on the lateral side of the right knee and shin; at the level of the upper margin of the right patella, is a violaceous, molluscoid pseudo-tumour, typical of the syndrome.

scar on the flexor surface of the right forearm said to have been caused by brushing against a rhododendron bush; mobile, discoloured, subcutaneous spherules were present in this area. A scar over the knee showed the typical wrinkled, raisin-like molluscoid tumour. The general examination otherwise revealed no abnormality.

Blood examination disclosed a bleeding time of four minutes, a clotting time of five minutes, a hæmoglobin value of 88%, a red blood cell count of 4,360,000 per cubic millimetre and a white blood cell count of 11,850 per cubic millimetre.

The film and differential white cell count were within normal limits.

The only treatment suggested was to advise a diet conducive to the further deposition of subcutaneous fat, the attempted hardening of the epidermis with spirituous applications and the wearing of protective clothing over vulnerable areas.

Summary.

A case of Ehlers-Danlos syndrome, occurring in a female child, aged six years, is presented. This syndrome is somewhat rare, less than fifty reported cases occurring in the literature. This paper gives briefly the history of the disease, its clinical features and its pathological findings; also included are some photographs of the patient showing the characteristic features of the condition.

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BICORNUATE UTERUS.

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AND
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THE following case is presented, as the sequence of events is interesting to follow.

Clinical Record.

The patient, Mrs. D.R., aged thirty-seven years, was admitted to hospital first on November 28, 1946, her condition having been diagnosed by her own doctor as ectopic pregnancy. Investigation of the past history revealed that her uterus had been twice curetted in 1939 for sterility and dysmenorrhœa, and that she had miscarried four times in 1940 and 1941, the last time at three months and three times at two months. In 1945 she had a full-term infant, which died twelve hours after a difficult labour and severe post-partum hæmorrhage. The patient said that she had menstruated nine weeks previously, and for the past twenty-eight days had suffered from a dull pain in the lower part of the abdomen, which was more pronounced on the right side and was associated with slight loss of dark blood *per vaginam*. She had felt slightly nauseated but otherwise was well.

On examination of the patient her temperature was normal, her pulse rate was 110 per minute and her pulse was of good volume. She looked well, the conjunctivæ were not pale, and examination of the heart and lungs revealed no abnormality. The blood pressure was 130 millimetres of mercury, systolic, and 80 millimetres, diastolic; the abdomen was lax except for voluntary rigidity in the suprapubic region, which was tender on palpation. A mass was palpable low down in the right iliac fossa. Vaginal examination revealed a soft cervix, movement of which produced pain, and the os was closed. Two masses were palpable in the pelvis, on the right side, the size of a twelve weeks' pregnancy, and tender but not exquisitely so, on the left side smaller, firmer and less tender.

The diagnosis of ectopic pregnancy was considered correct, and operation was carried out under "open" ether anæsthesia.

At laparotomy a thin-walled cyst-like structure was seen arising from the pelvis. Careful examination revealed that this was the rudimentary right horn of a bicornuate uterus. Its wall was paper-thin and almost transparent. It was opened, and a ten weeks' fœtus and placental tissue were removed. There was a large communicating cavity between the two compartments, it being possible to pass two fingers through the orifice. On retraction the right horn was found to be small and rudimentary, while the

left was relatively well developed. The smaller horn was closed and left *in situ*, as it was thought that excision would involve a large area of the uterine wall and the patient had expressed a desire to have a child.

The abdomen was closed and convalescence was uneventful. Examination four weeks later showed that retraction was complete and the right horn could be felt only with difficulty.

Eleven months later the patient reported that she was again pregnant, her last menstrual period having occurred on September 1, 1947. She attended regularly during the pre-natal period, and no obstetric abnormality was noted throughout. Routine X-ray examination of her chest revealed no abnormality; her blood was of group A (II) and Rh-negative; a moderate degree of anæmia was present which was treated with liver and iron. Reexamination two weeks prior to delivery showed the hæmoglobin value was 85%, the erythrocytes numbered 2,900,000 per cubic millimetre and the leucocytes 6000 per cubic millimetre; the vertex was presenting and fitting well into the pelvic brim. The patient was admitted to hospital on June 6, 1948, and given a transfusion of one pint of group A (II) blood, with a considerable improvement in her general condition. The following day it was found that the fœtus was lying transversely, but it was easily returned to its original position by external version. Recurrence of the transverse "lie" was noted next day and was again corrected easily. Pads and a tight binder were applied, and medicinal stimulation in the form of pituitrin (two minims every half hour) was commenced. The pains soon passed off, but repetition of the injections established regular contractions and the membranes ruptured at 6 p.m. on June 9. Progress appeared slow, and a rectal examination at 3 a.m. on the following day revealed a compound presentation with a prolapsed cord. Confirmatory pelvic examination showed the head, a hand, a foot and the cord presenting at a three-quarters dilated os. Bipolar version was carried out, and a living male child weighing five pounds four ounces was delivered. The placenta was removed manually and the presence of a bicornuate uterus was confirmed, the two portions appearing approximately equal in size. While the bicornuate nature of the uterus was obvious during the puerperium, it was extremely difficult to distinguish six weeks later when the uterus had involuted.

Discussion.

This case is one of the so-called *uterus bicornis unicollis*, and while there was considerable disparity in the size of the two portions, the smaller could not be considered truly rudimentary, in that there was a large communicating cavity between the two horns. Bicornuate uterus is merely one of the many individual variations caused by the incomplete fusion of the lower ends of the Müllerian ducts. This condition has been fully considered by Kermauer, and its relation to labour has been discussed by Munro Kerr. The state of the right portion prior to the first miscarriage is a matter for speculation, as it will be seen that with the hormonal influence of subsequent pregnancies there was a gradual development, until in 1948 examination during manual removal of the placenta showed that the two horns were approximately equal in size. The appearance of the uterus at laparotomy suggested that implantation in each of the four miscarriages had occurred in the right compartment, the development of which was inadequate to maintain the pregnancy to full term, and at operation the wall of the uterus was so thin that very little further development would have been necessary to cause rupture. The full-term pregnancies must both have occurred in the well-developed left side.

While the condition of bicornuate uterus is not particularly uncommon, it is considered that the sequence of events seen in this case merits report.

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Reviews.

MALIGNANT DISEASE AND ITS TREATMENT BY RADIUM.

THE second volume of Stanford Cade's "Malignant Disease and its Treatment by Radium" deals with malignant disease of the mouth, pharynx, larynx and neck.[1]

One of the best features of the volume is the detailed description of the pathology of the tumours and the clinical stages of the disease with numerous excellent illustrations. With regard to treatment several statements will not find general acceptance. For example, on page 78 the author states that the ideal treatment for carcinoma of the posterior part of the tongue is by teleradium. This is a method which few centres have available and high-voltage X rays appear to be just as effective. Cade's preference for teleradium is due to the fact that his experience of X-ray therapy has been limited to the 200 kilovoltage range.

The importance of metastases in cervical glands has been well stressed. A chapter is devoted to the anatomy of the cervical lymphatic glands, and to the incidence of metastases from various primary sites and from different pathological types. Few would disagree with the author's conclusions that in carcinoma of the tongue and palate a block dissection of the glands should be done whether they are palpable or not and that in the case of the lip, usually constant observation is advisable, with operation if suspicion of glandular involvement occurs.

A combined surgical and radiotherapeutic technique is advised for selected cases of carcinoma in such sites as the antrum, nose and larynx, and indeed Cade stresses throughout the book the necessity for cooperation between the surgeon and radiotherapist.

The Finzi-Harmer fenestration operation for carcinoma of the larynx and the Harmer-Cade modification of this have given good results, particularly when it is noted that the majority of the patients were not suitable for laryngofissure.

In the discussion on tumours of the mucous and salivary glands pre-operative irradiation is advised. The author states that this makes the operation no more difficult and that in some cases operation may be easier as the capsule is rendered tougher and thus less liable to break.

The volume is profusely illustrated with photographs, diagrams and anatomical plates. Numerous case histories are given with full details of tumour dose filtration and distribution of radium. The main weakness of the work is that the author has had little experience of X-ray therapy and consequently methods of treatment by radium are advised when deep X-ray therapy would be simpler and more effective.

CLINICAL CHEMISTRY IN CLINICAL MEDICINE.

BOTH the physician and the surgeon must summon the aid of the biochemist in determining the diagnosis and management of their patients. Uræmia, diabetic coma, paralytic ileus, jaundice and dyspepsia are but some of the many conditions which the biochemist can recognize and on which he can offer valuable guidance. We welcome the third edition (1949) of Stewart and Dunlop's excellent book, "Clinical Chemistry in Practical Medicine", which faithfully describes the application of simple biochemical methods to clinical medicine.[2] The authors state that their aim has been "to treat adequately within a small compass the more everyday problems requiring chemical investigation, than to produce an exhaustive treatise on the capabilities of the biochemical laboratory in medicine". They have achieved this. This third edition is delightful to read—lucid, concise and well illustrated with charts and tables. It has been almost entirely rewritten to include the more recently discovered chemical tests and current opinion in clinical medicine. The clinical notes will be most valuable to the clinician and they will also stimulate the biochemist

[1] "Malignant Disease and its Treatment by Radium", by Sir Stanford Cade, K.B.E., C.B., F.R.C.S., M.R.C.P., with a foreword by Sir Ernest Rock Carling, F.R.C.P., F.R.C.S., F.F.R.; Volume II; Second Edition; 1949. Bristol: John Wright and Sons, Limited. 9" × 5½", pp. 450, with 204 illustrations. Price: 52s. 6d.

[2] "Clinical Chemistry in Practical Medicine", by C. P. Stewart, M.Sc. (Dunelm), Ph.D. (Edin.), and D. M. Dunlop, B.A. (Oxon.), M.D., F.R.C.P. (Edin.), F.R.C.P. (London); Third Edition; 1949. Edinburgh: E. and S. Livingstone, Limited. 8½" × 5", pp. 336, with 30 illustrations. Price: 17s. 6d.

who too often leads a cloistered existence amongst his, or or her, burettes and bottles.

Rapid advances in our knowledge have called for considerable alterations in several sections, notably the liver function tests with special reference to the value of chemical tests in discriminating between primary hepatogenous jaundice and jaundice due to external biliary obstruction, the change in quantity and pattern of the plasma proteins in disease, and our rapidly advancing knowledge of endocrine disorders.

The authors point out the gaps in our knowledge. With regard to the malabsorption syndrome they write: "In spite of many recent clinical and biochemical studies, the exact nature of the group of diseases included in this term awaits discovery. It is uncertain whether the impaired absorption of fat is the most important or only the most obvious defect in the syndrome" (page 169). One is, however, surprised to read that "simple hyperchlorhydria is probably the commonest form of digestive disturbance" (page 146). Many wise physicians claim that hyperchlorhydria *per se* produces no ill effects.

We commend this book to physicians, surgeons and biochemists as well as to undergraduates. If this book can entice the biochemist to the wards or the clinician to the laboratory so that together they may make an accurate diagnosis and plan the management of the patient, then the authors will have achieved their ambition and medicine will be enriched.

CLINICAL ENDOCRINOLOGY.

"CLINICAL ENDOCRINOLOGY" is the title of a new book for practitioners and students by Dr. Laurence Martin and Dr. Martin Hynes, both of the Cambridge Medical School.[1] It can be confidently recommended to those who are capable of recognizing clinical syndromes of predominantly endocrinal component parts and who wish to fill in the physiological and pathological background and thus have a rational basis for advice and treatment.

Sir Lionel Whitby, the doyen of medicine at Cambridge, in a foreword, has directed attention to the excellence of the book as a readable, attractive and authoritative blending of new knowledge gleaned by experimental physiologists and applied to the clinical requirements of everyday practice.

The authors have worked into the text of the book a great deal of information concerning the interrelated interests of surgeons, gynæcologists, neurologists and physicians; so that the book is of the widest clinical applicability. They point out that they have deliberately omitted the subject of *diabetes mellitus*, as it is covered adequately elsewhere and would take up a lot of room if included.

As an example of the method adopted, reference may be made to Fröhlich's syndrome, which is described as a rare syndrome in which sexual under-development and obesity are associated with a cranio-pharyngioma or other lesion involving the hypothalamus and which has nothing to do with deficiency of pituitary secretions and is not likely to be relieved by the administration of pituitary extracts. The syndrome is generally caused by a tumour and visual disturbances and other symptoms of cerebral compression are usually prominent. On the other hand the rare familial disease known as Laurence-Moon-Biedl syndrome is often associated with pituitary abnormalities. The syndrome comprises obesity, genital hypoplasia, mental defect, *retinitis pigmentosa* (leading to blindness after puberty or in adolescence) and polydactly or syndactly.

In the chapter on the pineal body descriptions are given of the "infant Hercules" syndrome, "*macrogenitosomia præcox*" and of the adrenogenital syndrome affecting girls with sexual precocity of the virilizing type.

In the chapter on the thyreoid gland it is of interest to note the differentiation of the clinical components of thyreotoxicosis: (*a*) the thyreotoxic component indicative of overactivity; (*b*) the thyreocardiac component—being the effect on the heart; (c) the ophthalmic component in which the eye signs are grouped; and (*d*) the mechanical component related to the pressure of the goitre on surrounding structures. There is additional information about masked thyreotoxicosis and the thyreotoxic crisis and an account of the use of Read's formula to minimize the necessity for orthodox estimations of basal metabolic rates.

[1] "Clinical Endocrinology: For Practitioners and Students", by Laurence Martin, M.D. (Camb.), F.R.C.P. (London), and Martin Hynes, M.D. (Camb.), M.R.C.P. (London), foreword by Sir Lionel Whitby, C.V.O., M.C., M.D., F.R.C.P., D.P.H.; 1948. London: J. and A. Churchill, Limited. 8½" × 5½", pp. 236, with illustrations. Price: 15s.

There is a very welcome dissertation on Addison's disease and adrenal syndromes and a noble attempt has been made to unravel the tangled skein; at all events the authors have published a plethora of data to enable us to interpret the various laboratory procedures which may be invoked. Surgeons who feel confident that they will find a removable adrenal tumour in virilism are warned that the underlying pathological condition is more likely to be bilateral hyperplasia of the adrenal glands.

Once more emphasis is laid on the impossibility of attempting to cope with the peculiarities of one endocrinal gland to the exclusion of the others, and the picture is presented as an endocrinal system with roles for the constituent glands that are overlapping and modified by each other in the most complex fashion.

Generous references to recent books and articles in medical journals accompany each section and should enable any reader who needs further information to find what he wants.

The book is beautifully printed and adequately illustrated; all concerned with its publication deserve congratulations.

PSYCHOLOGICAL MEDICINE.

IN the preface to the third edition of "Psychological Medicine" Dr. Desmond Curran explains that the prolonged illness and recent death of Dr. Eric Guttmann, to whom he pays a well-deserved tribute, were responsible for delay in the revision of the edition which appeared in 1945.[1] The introductory chapter, in which a realistic viewpoint is combined with a philosophical outlook, contains a suggestion which should reach appropriate ears. The authors state: "It may be considered that, in a future programme of education and mental hygiene, more emphasis might profitably be laid upon duties rather than rights, and also upon the point that, throughout the ages, a modicum of discomfort and unhappiness has been the lot of mankind and that therefore to have these experiences was not necessarily evidence of illness."

The difficulty of deciding how far a patient should be assisted to escape from, rather than encouraged to face, the unpleasant is ever before the psychiatrist. The chapter on treatment continues to be placed early in the book, before those on the various clinical syndromes, an arrangement which might possibly lead some students to regard understanding of what is being treated as of secondary importance.

Chapter eleven on "affective reaction types" includes a section on psychosomatic medicine, in which the authors explain why some physicians have come to make a novelty of what is really a well-established line of approach to certain types of case.

In the chapter on hysterical reactions attention is called to the infrequency of grosser manifestations nowadays compared with the hysterical overlay in other psychoneurotic conditions, and also in illnesses of organic origin.

The final three chapters in the book form an appendix on "psychiatry associated with war conditions", which the authors had hoped to omit but for the present state of world affairs. There is a useful list of references for further reading in medical psychology, psychopathology and clinical psychiatry.

This new edition, which has been expanded to 252 pages, will maintain the reputation of its predecessors.

TREATMENT FOR THE CEREBRAL PALSIED.

MISS PAULA EGEL'S book, "Technique of Treatment for the Cerebral Palsy Child", fills a long-felt want in this sphere.[2] It deals with conservative treatment only, surgical treatment having been omitted deliberately as it does not fall within the ambit of Miss Egel's work.

The chapters can be summarized as follows: (i) Classification and Personalities, (ii) Aims and Methods of Physio-

[1] "Psychological Medicine: A Short Introduction to Psychiatry with an Appendix on Psychiatry Associated with War Conditions", by Desmond Curran, M.B., F.R.C.P., D.P.M., and the late Eric Guttmann, M.D., M.R.C.P., with a foreword by Sir John J. Conybeare, M.C., D.M. (Oxon.), F.R.C.P.; Third Edition; 1949. Edinburgh: E. and S. Livingstone, Limited. 8½" × 5½", pp. 264, with 20 illustrations. Price: 12s. 6d.

[2] "Technique of Treatment for the Cerebral Palsy Child", by Paula F. Egel; Introduction by Winthrop M. Phelps, M.D.; Appendix by Moir P. Tanner, F.A.C.H.A.; 1948. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 8½" × 5½", pp. 208, with 49 illustrations. Price: 26s. 6d.

therapeutic Treatment, (iii) Trainers, (iv) Apparatus and Equipment; and finally there is an appendix, written by Moir P. Tanner, dealing with the organization of a department of cerebral palsy in a children's hospital.

Miss Egel's composition is concise and in logical sequence and is easily read. The contents of the book imply a sound knowledge of physiotherapy by the reader and hold a far greater depth of meaning than the words express. This work should be a standard text-book for all physiotherapy students and should be read by all pædiatricians, orthopædic surgeons and physiotherapists.

The appendix is commended to ministers of health, hospital administrators and societies dealing with the physically handicapped.

Brief reference is made to splinting and many useful mechanical ideas are depicted in the prints of apparatus.

The clinical types described, the differentiation of muscles, and the methods used in charting muscles, could well become the standards for all those who treat these patients. Miss Egel may appear a little too dogmatic about types of personality, but the general picture is true and it is almost impossible to describe the shades of variation which do occur. She has omitted to mention the "hemiplegic" personality with difficulty in concentration and attention flitting from object to object, which make control and direction difficult. The concepts of the "Modalities" are most valuable.

It is hoped that Miss Egel will extend her writings to give still greater detail of treatment, to cover the splinting and bracing of these patients in minute detail, to give examples of typical daily routine and weekly treatment programmes—stating how many children one physiotherapist can adequately treat whilst maintaining all the necessary detail—and to include chapters by her co-workers on occupational therapy and speech therapy. In this way Miss Egel's books may well become the bible for the cerebral palsied.

A TEXT-BOOK OF HISTOLOGY.

WHEN one compares the school or university text-books of today with those of fifty years ago, one is struck by the fact that there has been, on the whole, a tremendous improvement in the technique of imparting knowledge, as well as in the art of printing and illustrating books. This is especially true of text-books of the descriptive sciences; the facts are illumined by an increasing appreciation of function; the dry bones live. The twelfth edition of "Bailey's Text-Book of Histology" is an instance of this.[1] Years ago, elementary text-books of histology were wont to be somewhat stereotyped and very dull. Epithelia, for example, were divided into simple and compound, and a list of the types of each division was given. In the volume under review, the idea of variations in epithelial cells is introduced as follows: "The height of epithelial cells varies from a very flat type (squamous) to a tall rod-like (columnar cell). Forms intermediate between these two types are cuboidal. Not infrequently various gradations are seen in the height of cuboidal cells, so that there are high cuboidal or low cuboidal; the latter being equally well characterized as low columnar." This small instance shows an attitude of mind far removed from mere enumeration.

The keynote of the book is the indissoluble relation between structure and function. To quote the introduction: "Histology in a restricted sense is the study of the tissues of the body, but since the tissues are composed of cells and their products a knowledge of the structure and activities of the cell must necessarily form the basis of histology. The first two chapters of the book are therefore given to a discussion of the cell, the first of these dealing with the cell after fixation and the second with the living cell". The distinction between living and dead tissue is further emphasized in the description of protoplasm in Chapter I: "He who seeks to know the structure of protoplasm discovers of *what* it is made, but not *how* it is made. Likewise, he who would know the function of protoplasm finds *what* it does but not *how it is done.*" A chapter on the way in which nervous tissue is organized to form a functioning system precedes the description of the histology of the nervous system. The emphasis on function is also evident in Chapter XX, which includes a full description of the cyclical changes of the endometrium. In the chapter on blood and lymph, the authors' explanation of the terms hæmocytoblast and myeloplast is somewhat confused. This, however, is after all debatable ground.

First published in 1904, Bailey's Histology has been enlarged and improved in succeeding editions; in the present one some extensive sections have been rewritten. Of the 455 illustrations many are in colour or half-tone; the colour plates are excellent. There are a number of bibliographic references at the end of each chapter. The authors state that in presenting controversial subjects they have emphasized points of agreement rather than of disagreement and have excluded a considerable body of facts which should be included if this was a source book for teachers and research workers. The book is offered as a text-book primarily for the use of first-year students in medicine and dentistry. While it is admirably suited for that purpose, it is no mere primer to be outgrown and discarded, but an "adult" book, competent, dignified and well written. It has the quality of stimulating interest and even, sometimes, of awakening wonder. It provides an almost "humanistic" introduction to histology.

[1] "Bailey's Text-Book of Histology", revised by Philip E. Smith, Ph.D., and Wilfred M. Copenhaver, Ph.D.; Twelfth Edition; 1948. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9″ × 6″, pp. 812, with 455 illustrations, many of them coloured. Price: 52s. 6d.

A HANDBOOK OF SURGERY.

THE second edition of Mekie and Mackenzie's "Handbook of Surgery", a product of the Edinburgh school, makes a welcome appearance.[1] One cannot expect more than a broad outline in a handbook of this nature, but most of the pertinent points and salient features in general surgery are well and succinctly set out. Especially to be noted is a short section on water and salt requirements in disease, where the influence of Marriott is acknowledged. The Watson-Jones teaching in the chapters dealing with bone and joint injuries is followed and worthily expounded.

There are naturally many omissions and no doubt future editions will be continually necessary. There is no mention of streptomycin, or of the liver function tests which may help to differentiate types of jaundice. Nor are the newer aspects of vascular anastomoses discussed. References which would be helpful for more detailed study could well be given at the end of each chapter. However, a most comprehensive survey of general surgery is presented, which would be of tremendous help to the final year student and the young practitioner.

OPHTHALMIC SURGERY.

THE second edition of Dr. Wiener's "Surgery of the Eye" will enhance the high regard that the first edition, published just before the outbreak of war in 1939, already enjoys amongst ophthalmic surgeons.[2] The author's treatment of his subject is unusual, for although the discussion is along the highest planes of ophthalmic surgery, he does not try to make of it a reference text-book, presenting a list of alternative methods. Dr. Wiener has made his choice of approach to each surgical situation; he describes this approach, in each instance, with lucidity and emphasis, his descriptions being clarified by profuse and accurate drawings of the main steps of every operation.

This is not a book for the general practitioner; it is a manual for the specialist in ophthalmic surgery, who may disagree with many of the author's conclusions. Nevertheless, no one endeavouring to practise ophthalmic surgery could fail to obtain profit from reading it, for it is a record of the opinions and experiences of a man who has given his life, with outstanding success, to the practice of his specialty, and who has made several original contributions to the surgery of the eye.

Although the author differs from Australian oculists in regard to some of the methods accepted by them, it is interesting to note that he advocates the use of keratome and scissors in the making of a cataract incision, a view put forward by an Australian in 1944 and since recommended by the great American surgeon Ramon Castroviejo, who in 1948 stated that in his opinion the day of the cataract knife had gone, giving place to the more sure, though less spectacular, scissors.

He is unsparing in his criticism of shoddy surgery; but although he gives pride of place to his own methods of

[1] "Handbook of Surgery", by Eric C. Mekie, M.B., Ch.B., F.R.C.S. (Edinburgh), F.I.C.S., and Ian Mackenzie, M.B.E., M.B., Ch.B., F.R.C.S. (Edinburgh), with a foreword by the late Sir John Fraser, Bart., M.C., M.D., Ch.M., F.R.C.S. (Edinburgh); Second Edition; 1949. Edinburgh: E. and S. Livingstone, Limited. 7¼″ × 4½″, pp. 784, with 29 illustrations. Price: 20s.

[2] "Surgery of the Eye", by Meyer Wiener, M.D.; Second Edition; 1949. New York: Grune and Stratton. 9″ × 5¾″, pp. 442, with 425 illustrations. Price: $12.00.

operation in glaucoma, corneal transplantation, strabismus and lachrymal sac lesions, strenuously maintaining the value of his own technique, he is not ungenerous in his mention of other men's ideas.

In the treatment of retinal detachment he is especially generous, because although he devised his own method of double-trephining of the sclera, combined with the insertion of a horsehair seton to maintain drainage, he gives pride of place to electro-coagulation with multiple punctures; in his opinion, the barrage method is superior to methods dependent upon localization of retinal holes or tears, owing to the many factors rendering the latter technique uncertain and inaccurate.

The book has the faults of its virtues, being limited by the boundaries of one man's methods, but as a personal record of a great surgeon's ideas, it is worthy of a place in every ophthalmic surgeon's library.

STUDIES IN NEUROLOGY.

IN "Critical Studies in Neurology" F. M. R. Walshe, of University College, London, has collected together and reprinted a series of papers published chiefly in *Brain* between 1942 and 1947.[1] The scope of these studies is most clearly shown by an enumeration of their titles: (*a*) "The Anatomy and Physiology of Cutaneous Sensibility"; (*b*) "The Giant Cells of Betz, the Motor Cortex and the Pyramidal Tract"; (*c*) "On the Mode of Representation of Movements in the Motor Cortex, with Special Reference to Convulsions Beginning Unilaterally"; (*d*) "On the Notion of the 'Discrete Movement' in Willed Motion"; (*e*) "On the Role of the Pyramidal System in Willed Movements"; and (*f*) "The Integration of Medicine".

In his foreword the author writes: "A prime purpose of this reprint, therefore, is to stimulate critical thinking among post-graduate students of neurology who may wish to penetrate more deeply into one or other aspect of this fascinating branch of medicine."

In the first study (1942) on cutaneous sensibility there can be no doubt that the author crystallized out the thoughts of workers of the period and in so doing made this paper a landmark. From his analysis the following points emerge: (i) "It is not the individual impulse that shows special qualities, but rather the entire sensory pathway for each mode of sensibility along which pass the streams of nerve impulses." (ii) The long-established view that there are four primary modes of cutaneous sensibility: touch, pain, cold and warmth also receives consistent support. (iii) Further, the conception of the physiological unit of sensory reception analogous to the motor unit is becoming clearer. (iv) Finally, the view that end organs have selective excitability is reasonably established and the accessory nerve supply of end organs clears up some of the difficulty that this conclusion has previously presented. In addition, a bibliography of the more pertinent literature on this subject since 1942 has been added.

Chapters II, III, IV and V all form a related series of studies on the motor aspect of the central nervous system. The first important conclusion in the second chapter is that there is an accumulated body of evidence that the Betz cell is merely the largest category of pyramidal cells and cannot on histological grounds be separated from them as something essentially different.

The writer further attacks the conception of motor and pre-motor areas put forward by Fulton, Bucy and their collaborators. Nevertheless, he recognizes "the dual symptomatology associated both experimentally and clinically with lesions of cortex in this region, namely now spasticity and, at other times, flaccidity", and tentatively puts forward an alternative hypothesis based on the view that the pyramidal cells of lamina V differ in function from those of lamina III.

The cortical mosaic or punctate theory of motor points is strongly criticized by the author and rejected in favour of the hypothesis of widespread fields of localization of movements.

He concludes (Chapter III, page 186) that this theory (the cortical mosaic of "points" *et cetera*) does not adequately generalize the facts of clinical or experimental observation.

His final study in the motor group, on the pyramidal system, is most stimulating and interesting, and should be studied by every clinical neurologist. In his summary he writes: "The pyramidal tract is an internuncial path, a common path, standing between the massed receptors on the one hand and the motor mechanisms on the other. It has evolved in particular relation to the development of the distance receptors, perhaps vision alone, and has reached its highest importance in man. The pyramidal system of itself initiates nothing, and to speak of it as 'responsible for' this or that category of movements is to ignore the source and motive power of its activities. It is simply the channel through which pass the impulse volleys by which willed movement is activated and continuously moulded by controlling afferent patterns of excitation." He also points out grave defects in the widely current conceptions of pyramidal function.

In the final chapter on the integration of medicine the author pleads first of all for the necessity of integration and synthesis as a counteractive to specialism, differentiation and accumulation of facts and, as a necessary aid thereto, pleads for a more liberal preliminary education in the three arts of the mediæval scholar, namely, grammar, rhetoric and logic.

Enumerating in detail the tasks involved in the rebuilding of medicine, he also draws attention to the necessity of ensuring, as and when the human resources are available, that those who hold key positions in centres of medical education and research shall be men interested not only in research and routine teaching, but also in general ideas.

By way of general criticism of these studies it appears to us that the author has occasionally used his great powers to descend to somewhat too biting criticism. This feature is, however, a matter of taste, and much of it is undoubtedly salutary and well deserved.

In conclusion, whether one agrees with the author's ideas in all respects or not, it is clear that every clinical neurologist as well as the neuro-physiologist should have clearly in mind the criticisms, general principles and definitions which the author puts forward, whether it be in the field of sensation and the sensory pathways or in regard to the motor cortex and the role of the pyramidal system, or in the general field of medicine.

[1] "Critical Studies in Neurology", by F. M. R. Walshe, M.D., F.R.S.; 1948. Edinburgh: E. and S. Livingstone, Limited. 8½" × 5½", pp. 276, with illustrations. Price: 15s.

STUDIES ON THE PARATHYREOID GLAND.

THE names of Fuller Albright and E. C. Reifenstein, junior, together with those of their co-workers J. C. Aub, W. Bauer, T. G. Drake, A. P. Forbes, R. W. Fraser, H. W. Sulkowitch and others, are already well known in relation to researches on the parathyreoid gland and its influences, carried out during the past quarter of a century in the metabolic ward of the Massachusetts General Hospital. A selection of these studies, made by the first two authors named, now appears under the title "Parathyroid Glands and Metabolic Bone Disease", and the volume shows the uneven quality that inevitably results from the assembling of long sections from published papers without any undue effort to integrate them into a unified whole.[1]

The chapters on clinical hyperparathyreoidism, osteoporosis, osteomalacia and polyostotic fibrous dysplasia (well known as the eponymous syndrome of the first-named author) are full and authoritative. That on clinical hyperparathyreoidism covers a wide field and contains the most material of interest to a general physician. The final chapter on Paget's disease is less comprehensive.

There are a large number of illustrations of X-ray films, and histopathological preparations which are of excellent quality, and also a large number of charts illustrating biochemical investigations, some of which will prove complicated and confusing to a reader not already well acquainted with the subject. A short appendix records the various techniques used in the authors' biochemical investigations and this is followed by a bibliography, predominantly American, and an unnecessarily exhaustive index.

Those specially interested in this field of human pathology will be gratified to have the principal writings of Albright and his colleagues in permanent form, but in spite of the observations on the wrapper that "post menopausal osteoporosis and senile osteoporosis are extremely common and very troublesome conditions" which "nearly every physician meets in his general practice" this book may be regarded as outside of the scope of the expected reading of "orthopedists, internists, urologists, students and surgeons" to whom it is commended by the same source. It is unfortunate that such skilled and enthusiastic workers have not been able to record their data and opinions in a language more closely related to the accepted standards of written English.

[1] "The Parathyroid Glands and Metabolic Bone Disease: Selected Studies", by Fuller Albright, A.B., M.D., and Edward C. Reifenstein, junior, A.B., M.D., F.A.C.P.; 1948. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" × 5¾", pp. 424, with 156 illustrations. Price: 60s.

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

AN AUSTRALIAN RHEUMATISM COUNCIL.

On May 25, 1949, an Australian Rheumatism Council was inaugurated at a meeting called for that purpose by The Royal Australasian College of Physicians. This will be gratifying to those members of the medical profession in Australia who tried to bring it about a little more than ten years ago. The present event is the direct result of a movement which started in England about fifteen years ago, a movement which led to the creation of the Empire Rheumatism Council. Reference was made to this body in the editorial columns of this journal in June, 1938, and it was then stated that it was the desire of the Empire Rheumatism Council that an affiliated body should be formed in Australia to pursue the war on rheumatism. In these circumstances it will be useful, as a prelude to further mention of the recent meeting at Sydney, to refer to the Empire Rheumatism Council and to what was attempted in Australia ten years ago.

The Royal College of Physicians, in London, which had for some considerable time recognized the need for coordination of advances made in the study of the chronic rheumatic diseases, appointed in 1934 its Committee on Chronic Rheumatic Diseases. It was realized before long that this committee, from the circumstances of its appointment, could not receive money or deal directly with the public and that some extraneous source of funds for the furtherance of research would have to be found. A decision was made to form for this purpose a body consisting of both medical and non-medical persons. Accordingly at a meeting of the Royal College of Physicians Committee on Chronic Rheumatic Diseases in February, 1936, the Empire Rheumatism Council was formed. His Royal Highness the Duke of Gloucester accepted the presidency of the new body and Lord Horder was appointed as its chairman; the honorary medical secretary was Dr. W. S. C. Copeman. In planning its campaign the Council recognized four principal requirements for the reduction of industrial morbidity from chronic rheumatic diseases. These were: (*a*) research into causation; (*b*) investigation of the comparative value of different therapeutic measures; (*c*) increased provision of the various forms of physical treatment, which could not be provided by the general practitioner; (*d*) increased in-patient accommodation, especially in the form of research units in hospitals. In addition the Council planned a programme of education of the public, first of all about the wisdom of prompt attention to the early stages of rheumatic disease, and secondly in regard to the danger of reliance upon proclaimed remedies, which were often fraudulent. The intention was that the investigations of the Council should be Empire-wide and should cover lands of different climates and modes of living.

We now come to the time when plans were being made to hold a session of the Australasian Medical Congress (British Medical Association) at Perth in 1940. It will be remembered that an earlier attempt to hold a session in Perth had been frustrated owing to the financial depression. The Executive Committee of the congress which was to have been held in 1940 decided to have as the central theme of the session the subject of rheumatism. As the Editor of this journal was about to visit England he was asked to find a prominent physician in England who would be willing to undertake the journey to Australia in order to address the plenary session on the subject of rheumatism. An eminent physician willing to do this was found. He suggested that a branch of the Empire Rheumatism Council should be formed in Australia and it was largely with the object of forming such a body that he was prepared to undertake the journey. After the Editor's return to Australia he reported these facts to the Federal Council. (See THE MEDICAL JOURNAL OF AUSTRALIA, April 22, 1939, page 630.) A discussion took place and several members of the Council agreed that the formation of an Australian branch of the Empire Rheumatism Council would be useful; it was pointed out, however, that the body in question was not composed entirely of persons with medical qualifications and that therefore the Federal Council could not undertake the formation of a branch in the Commonwealth. Having come to this quaint decision, the Federal Council made the naïve suggestion that a special group should be formed within the Association for the study of rheumatism and that this group could then proceed to the formation of a branch of the Empire Rheumatism Council. Fortunately or unfortunately (the adverb depends on the point of view adopted) the 1940 congress was not held at Perth and its executive committee had not to face the embarrassment that would have arisen as a result of the Federal Council's decision. The point about all this is that the Federal Council lost the initiative in the establishment of a body calculated to aid in the prevention and elimination of one of man's most serious group of diseases. The initiative has now passed to another body.

At the recent Sydney meeting, after the President of The Royal Australasian College of Physicians, Dr. L. S. Latham, had welcomed those who were present, Dr. C. G. McDonald was asked to preside, as he had been engaged in the preliminary arrangements. Dr. McDonald informed the meeting that the proposal to establish an Australian Branch of the Empire Rheumatism Council had emanated from the visit to Australia and New Zealand in 1948 of Dr. C. B. Heald, a member of the Empire Rheumatism Council. Dr. Heald had discussed with Dr. S. A. Smith (at that time President of The Royal Australasian College of Physicians), Sir Claude Plowman and Mr. Vincent

Fairfax the possibility of the formation of a branch, and upon his return to London Dr. Heald had taken the matter up with executive officers of the Empire Rheumatism Council. In July, 1948, Dr. McDonald had had further discussions, during a visit to London, with Lord Horder, chairman of the Council, with Dr. W. S. C. Copeman, its honorary secretary, with Sir Walter Kinnear, the honorary treasurer, with Dr. Heald and with others. Dr. McDonald added that the Duke of Gloucester was interested in the establishment of an Australian branch and he read a letter from His Royal Highness inviting The Royal Australian College of Physicians to take steps to bring this about. It was then decided to form an Australian Rheumatism Council. The name "Australian Rheumatism Council" was chosen rather than "Australian Branch of the Empire Rheumatism Council" on the advice of Mr. F. P. McRae, Crown Solicitor of New South Wales, for several reasons. One reason was bound up with the constitution of the Empire Rheumatism Council and another had to do with taxation and donations to funds. With the name "Australian Rheumatism Council" there could be no doubt that it would be an organization entirely governed and controlled in Australia and devoted to medical research in the Commonwealth. A constitution was adopted and the objects of the new body were set out in the constitution as follows:

(*a*) to institute, or assist the institution in any part of Australia, of research into the causes and the means of cure or alleviation of any form of rheumatic disease;
(*b*) to establish or assist in the establishment or extension of special hospitals or of special wards in general hospitals or of hydrological or radiological institutions, for the treatment of rheumatic diseases;
(*c*) to endow chairs, readerships, lectureships or fellowships at appropriate University Medical Schools for the purpose of conducting research and providing instruction in relation to rheumatic diseases and allied disorders of the joints, muscles and nerves;
(*d*) to acquire and, subject to the Rules, to hold and dispose of property for any of the purposes of the Council and, in the case of any property acquired by gift, devise or bequest made subject to conditions to which the Council has agreed, to comply with and observe those conditions;
(*e*) to secure affiliation with the Empire Rheumatism Council;
(*f*) to collaborate with, or to secure an exchange of information with the Empire Rheumatism Council and other institutions or associations conducting research of the nature referred to above;
(*g*) to communicate by means of lectures, discussions, demonstrations or publications any knowledge gained by the Australian Rheumatism Council as to the causes of rheumatic diseases and as to methods of prevention, alleviation and cure of such diseases.

Office-bearers were elected. In accordance with a suggestion received from the General Secretary of the Empire Rheumatism Council, it was resolved that His Royal Highness the Duke of Gloucester should honour the Australian Rheumatism Council by becoming its first president. The two vice-presidents were Dr. L. S. Latham, President of The Royal Australasian College of Physicians, and Dr. George Bell, President of the Royal Australasian College of Surgeons; these were *ex officio* appointments. The other office-bearers chosen were: Chairman: Dr. S. A. Smith; trustees: Mr. Alick Osborne, Sir Claude Plowman and Mr. Vincent Fairfax; honorary secretary: Mr. M. C. Buttfield; executive committee: Mr. Justice L. Herron, Mr. M. C. Alder, Mr. F. P. McRae, Mr. Ernest Turnbull, Dr. A. J. Collins, Dr. C. G. McDonald, Professor Alex. Murphy. It should be pointed out that the constitution provides for the appointment of a Scientific Advisory Committee to be composed of members of the medical profession and "other persons of suitable scientific attainments". This committee, which is to have the function of advising on all medical matters, is to have power to coopt at any time any person with the requisite qualification. There will also be a finance committee.

The Australian Rheumatism Council has started in a small way. The gathering at the inaugural meeting was small and all present will be the foundation members. It is intended to form branches in each State of the Commonwealth and a great deal will depend on the persons, medical and non-medical, who form these branches. Dr. C. G. McDonald declared at the inaugural meeting that the Council should proceed slowly, particularly in the formation of the Scientific Advisory Committee. It is this committee which will set the standard of work done by the Council. At the Australasian Medical Congress to be held next year in May and June at Brisbane, rheumatism is to be discussed at the plenary session. Professor Alex. Murphy, who is president-elect of the Congress, will preside at the plenary session, and he has been elected to the Executive Committee of the Australian Rheumatism Council. This is one way in which the ground is being prepared for the work of the Council. Although work is done by individuals, it is to be hoped that The Royal Australasian College of Physicians will continue to take a leading part in what is done, and that the Australian Branches of the British Medical Association and the Royal Australasian College of Surgeons will give all the aid that lies in their power.

Current Comment.

UNDECYLENIC ACID, PSORIASIS AND NEURODERMATITIS.

AN interesting contribution has been made recently to the management of certain skin diseases. Though as yet no firm claim is made, the fact that new hope is raised of doing something about the rather depressing problem of psoriasis makes the work worthy of consideration. Having in mind the finding of other workers that with the onset of puberty in children the sebaceous glands of the scalp start to secrete a sebum which contains, in higher concentrations than before puberty, saturated fatty acids of a low boiling point with selective fungistatic and fungicidal action on *Microsporon audouini* (which, according to Roxburgh, causes over 90% of the cases of ringworm of the head in school children in London), H. H. Perlman[1] conceived the idea that the oral administration of one of the saturated or unsaturated fatty acids might be therapeutically effective in the treatment of *tinea capitis* due to *Microsporon audouini*. Results were encouraging, but no ultimate cure was obtained with the dosages used. For reasons which Perlman does not make clear, the experiment was discontinued; but the observation that undecylenic acid caused profuse desquamation of the scalp suggested to him that it might be effective in the treatment of psoriasis. He tried it with one patient and the result apparently encouraged him to go on; his preliminary report on the effects of the treatment on a series of 17 patients with chronic psoriasis as well as eight with neurodermatitis makes thought-provoking reading. The patients with psoriasis, which was both localized and generalized, were given gradually increased doses of undecylenic acid by mouth for varying periods

[1] *The Journal of the American Medical Association*, February 12, 1949.

of time, with definite improvement, characterized by disappearance of the psoriatic lesions (completely in some cases and to a substantial degree in all), permanent relief of the itching complained of and, in several instances, associated with arthropathy, partial or complete relief of the joint pains. However, Perlman makes it clear that the series is small, optimal dosage has not yet been determined and no definite means has been found of foretelling which type of patient will respond more rapidly. The greatest benefit seems to have been gained with more or less generalized subacute and chronic lesions. The chronic indurated localized plaques on elbows and knees respond much less rapidly. Notable success seems to have been achieved in the prevention of recurrences. Longer observation of the patients and extension of the series will no doubt serve to clarify the position. Perlman warns against the general use of undecylenic acid until thorough scientific research has been completed; frequent examination of the urine and complete blood counts are necessary during administration of the drug, and continuous watch must be kept for untoward reaction. How the effect is produced in the cases of psoriasis, or in those of the rather more elusive neurodermatitis, is at best only a matter for speculation, but it is to be hoped that these possibilities will be pursued by those who are in a position to make controlled observations. Indiscriminate clinical use would seem to be unjustified at present.

ISOPROPYLEPINEPHRINE AND BRONCHIAL ASTHMA.

AN isopropyl modification of adrenaline (or epinephrine, as it is normally called in the United States) has recently achieved some prominence. This drug, racemic 1-(3-4-dihydroxyphenyl)-2-isopropylaminoethanol, has been named variously "I.P.A.", "Aleudrin", "aludrine", "Isorenin", "Isonorin" and "Isuprel". The clinical evaluation of its use in the management of bronchial asthma has been the subject of a report by L. N. Gay and J. W. Long,[1] the publication of which has been authorized by the Council of Pharmacy and Chemistry of the American Medical Association. The report is a long one, but in view of the importance of the drug the main points of Gay and Long's findings should be mentioned. They describe isopropylepinephrine as "a sympathomimetic amine capable of bronchial-dilating action in bronchial asthma when administered by mouth, sublingual absorption, inhalation and subcutaneous injection". The name "aludrine" is used throughout the report, and as there is no indication that it is a proprietary name, we will use it here for convenience. Gay and Long have administered the drug in a variety of ways to a large series of patients of different types and ages and under varying conditions. They found a wide variation among patients in both therapeutic response and occurrence of side actions. The inhalation of a nebulized mist of aludrine of strength 1:200 proved to be the best method of administration, generally affording relief from asthma of all grades of severity with an incidence of side effects of only 4%. Aludrine in this form greatly facilitated the liquefaction and excretion of sputum in the presence of chronic asthma. Sublingual absorption of 10-milligramme pellets is stated to be the second method of choice because of its convenience and speed of action and the fact that the patient can discard all undissolved drug in the event of serious side effects. The "sublinguet" was of greatest value in the early abortion of mild asthma, of less benefit in moderate asthma and of no benefit in severe asthma; 33% of users experienced mild and fleeting side actions. The routine use of aludrine by mouth was found to be impractical because of the high incidence of side effects (75%) with use of the minimum effective dose (15 milligrammes). In general, Gay and Long state, the relief afforded does not justify the unpleasant symptoms associated with its oral administration. With regard to subcutaneous injection, the use of a concentration of aludrine of 1:1000 is regarded as potentially dangerous, as shown by the high incidence of pronounced side effects and the demonstration of changes in electrocardiographic patterns; but for selected patients doses of 0·3 to 0·5 millilitre of aludrine solution 1:5000 are considered to be safe and practical, having a therapeutic efficacy about equivalent to the customary doses of adrenaline solution 1:1000. Experience has shown that aludrine by inhalation and injection is effective for those patients no longer responding to adrenaline. The subcutaneous injection of aludrine solution 1:1000 causes pronounced tachycardia and increase in pulse pressure, with moderate rise in systolic and fall in diastolic blood pressure levels; in 1:5000 concentration it causes a slight increase in cardiac rate and a slight elevation of systolic blood pressure, the diastolic pressure generally remaining constant. Overdosage by mouth or subcutaneous injection and therapeutic doses given by the same routes to sensitive persons may produce symptomatic and electrocardiographic evidence of coronary insufficiency; given sublingually or by inhalation in therapeutic doses it produces no subjective evidence of coronary insufficiency. In therapeutic dosage aludrine does not significantly alter blood sugar concentrations. Side effects were found to be relatively common with every method of administration except inhalation, the sublingual and inhalation methods of administration being most favoured by both patients and doctors because of their advantages in relation to side effects. A number of serious side effects—anginal pain, precordial ache and shock—were noted, associated with either oral or subcutaneous administration. No significant effect was found on the blood picture of 10 patients who took aludrine by mouth for prolonged periods. Altogether Gay and Long's report is comprehensive from the purely clinical viewpoint and warrants study by those who desire more detailed information. It provides practical guidance, the significant points of which we have indicated, in the use of a new and clinically useful drug.

[1] *The Journal of the American Medical Association*, February 12, 1949.

AN INVESTIGATION INTO THE VITAMIN A REQUIREMENTS OF HUMAN ADULTS.

TOWARDS the end of 1940 the Ministry of Health in Great Britain gave its approval to proposals for the experimental study of the natural history and mode of transmission of scabies. The chief feature of these proposals was to enlist the cooperation of conscientious objectors to military service. The result was successful and what became known as the Sorby Research Institute grew up at a converted villa in Sheffield. A series of experiments in human biology was carried out and the institute came under the control of the Medical Research Council for five years from the spring of 1942. A request was received by the Medical Research Council from the Ministry of Food for information on the adult requirement of vitamin *A* and its precursor, carotene. An investigation was planned and controlled by a team of workers of which the nucleus was formed by the Vitamin A Sub-Committee of the Accessory Food Factors Committee. This Sub-committee, which consists of five persons and a secretary, has as its chairman Sir Edward Mellanby, F.R.S., and is appointed jointly by the Medical Research Council and the Lister Institute of Preventive Medicine. The investigation was made at the Sorby Research Institute and the subjects were twenty men and three women volunteers, conscientious objectors, mostly between the ages of twenty and thirty years. The results of the investigation have been published as a special report of the Medical Research Council.[1]

The Medical Research Council points out in the preface that war conditions made it doubtful how long the inquiry could be continued and "for this and other reasons it was considered necessary to start the volunteers on

[1] "Vitamin *A* Requirement of Human Adults: An Experimental study of Vitamin *A* Deprivation in Man"; Privy Council, Medical Research Council Report Series, Number 264, compiled by E. M. Hume and H. A. Krebs; 1949. London: His Majesty's Stationary Office. 9½" × 6", pp. 146. Price: 3s. 6d. net.

the experimental diet with no preliminary period of observation". It was unfortunate that an insufficient number of observations was made to establish the vitamin *A* content of the subjects before they began to receive the experimental diet, because data regarding a normal level had to be assembled from the literature and from the observation of other subjects. The inquiry, as a matter of fact, lasted for two years and the research team comprised more than twenty-five persons, many of whom were concerned in more than one aspect of the inquiry. The report, which is a document of 146 pages, contains a concise account of the investigation and an elaboration of special aspects. Much of the evidence is given in detail. It will be impossible to give a summary of this detail. For this, readers with a special interest will need to consult the original document; for others, the general direction of the findings will be stated.

The twenty men and the three women received, for periods ranging from six and a half to twenty-five months, a diet deficient in vitamin *A* and carotene, but complete in all other respects. This diet consisted of natural foodstuffs. It was found by chemical tests to supply no more than 70 international units of β-carotene daily, and it is pointed out that biological tests with rats have shown this to be very low in vitamin *A* potency. Sixteen of the subjects received the diet unsupplemented until they showed unmistakable signs of deficiency or were obliged to leave the experiment for extraneous reasons; they were then dosed with vitamin *A* or carotene. Five of the subjects received every day about 5000 international units of β-carotene in different forms at different times. Two subjects received 2500 international units of vitamin *A* as a concentrate. It is pointed out that vitamin *A* and its precursors present an unusual complexity of problems owing to their varying availability from different foods. Apart from the varied needs of different individuals, the principal problems in attempts to assess the vitamin *A* requirements of a normal human adult are: (*a*) the amount required when the source is vitamin *A*; (*b*) the amount required when the source is β-carotene, the availability of β-carotene from different foods, the equivalence of β-carotene and vitamin *A*; (*c*) the value of other active carotenoids in terms of vitamin *A*; (*d*) the effect of tocopherols or other stabilizers on the requirement. In this regard readers are referred to a short discussion in these columns in the issue of December 14, 1946, in which the precursors which vitamin *A* may have in the human diet are mentioned. In the present inquiry no attempt was made to deal with the last two of the four problems just stated. The first result noted in the investigation was a drop in the carotenoid content of the blood. Within three months the initial average value of about 150 international units fell to about 40 international units per hundred millilitres. Most, if not all, of the residual carotenoid content was made up of substances other than α-carotene and β-carotene. No other effect which could be ascribed to the deficient diet was encountered during the first eight months. As already mentioned, the vitamin *A* content of the blood of the subjects was not established before they received the experimental diet. The value arrived at from the literature and from the observation of others subjects was 120 international units per 100 millilitres. For the first two months on the diet the deprived group had an average plasma value for vitamin *A* of 88 international units per 100 millilitres. After about eight months a downward trend was noted in ten of the sixteen volunteers in the group. The fall became pronounced in the case of four men who reached levels below 50 international units of vitamin *A* per 100 millilitres. On the other hand, one man showed no appreciable drop even after twenty-two months of deprivation. The capacity for adaptation to the dark was measured. During the first few months of the deprivation no change was noted, but during the winter months a slight but definite deterioration occurred; curiously this deterioration was made good in the following two months in all but two instances. The normal "cone-rod transition time" varied between five and twelve minutes. The values remained throughout the experiment almost completely within this range, except in the case of three subjects. The highest value noted was thirty-three and a half minutes. The great majority of clinical examinations revealed no significant differences between the deprived and the non-deprived group. The only signs and symptoms which seemed to be commoner in the deprived group were dryness of the skin and eye discomfort. Audiometry revealed a significant worsening of hearing in the deprived group. There was no evidence that the deprivation of vitamin *A* impaired the psychological condition of the subjects.

The requirements of vitamin *A* in terms of vitamin *A* and of carotene are discussed. It is stated that an amount of about 1300 international units was found to be a minimal protective dose of vitamin *A*; a figure of 2500 units daily is an estimate of the requirements to cover individual variations and to leave a margin of safety. For carotene it is stated that the value for the minimal protective dose must be based on that for maximal effective dose and not on that for intake. The minimal protective dose of carotene is set down as about 1500 international units daily and the figure of 3000 units is put forward as the value for the requirement to cover individual variations and to leave a margin of safety. A warning is issued that the daily requirements stated must not be used without discretion. No suggestion is made how the values should be modified to apply to children, pregnant or lactating women, or diseased persons.

The Medical Research Council in the preface states the conclusion that vitamin *A* deficiency is much less easily or rapidly induced in hitherto well-fed adults than has previously been supposed. As the Council states, the negative conclusions of the experiment and the sense of complexity inseparable from all such studies on human beings are the chief impressions left by the reading of this report. Though this is true, the technical detail of the investigations will be of interest to all who conduct experiments in medicine.

Two conclusions which are really separate from the main theme of the inquiry should be mentioned. The effect of the consumption of alcohol on the plasma level for vitamin *A* and on the capacity for dark adaptation was tested. The plasma level of vitamin *A* was not affected; the capacity for dark adaptation was not improved, and in some cases was reduced by consumption of alcohol. It is pointed out that these results are at variance with those of Clausen and others, who thought that the response of the plasma level for vitamin *A* to the administration of alcohol might act as an index of the magnitude of the liver reserves of vitamin *A*. The other conclusion has to do with the possible synthesis of carotene in the human intestine. (See "The Biosynthesis of Vitamins", THE MEDICAL JOURNAL OF AUSTRALIA, July 7, 1945.) The finding that the pigments of *Staphylococcus aureus* include α-carotene and β-carotene was confirmed, but the available evidence was against a synthesis of carotene by microorganisms in the intestine.

PROTECTION FROM X RAYS.

IN the early days of the use of X rays and radium tragic experience taught workers amongst radiations the need for protective measures. Modern equipment and practice have brought new problems, and the possible hazards both to radiation worker and to patient need, in many cases, to be reconsidered. It is appropriate then to call attention to a new handbook, published by the National Bureau of Standards in the United States of America, in which are set out recommended standards of safety for the installation and use of high-voltage X-ray equipment.[1] This handbook was written by a subcommittee of the National Committee on Radiation Protection composed of representatives of radiological societies, electrical societies and the National Bureau of Standards.

[1] "Medical X-Ray Protection up to Two Million Volts", National Bureau of Standards Handbook 41; 1949. 5¼" × 8½", pp. 49. Obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price: 15 cents.

It contains instructions for meeting currently accepted standards as well as advisory recommendations intended to be applied where possible. Rules are given relating to working conditions, the survey and inspection of installations, the planning of an X-ray installation, structural details of protective barriers and specific types of installations. A special chapter deals with protective measures and rules relating to the electrical components of X-ray apparatus, and an appendix contains tables and graphs for determining the requirements of protective barriers and distance protection in specific cases. The recommendations are intended primarily for the protection of the radiation worker and not for the patient; but attention is drawn to the need today for "great caution and restraint" in the use of X rays for diagnosis and the treatment of non-malignant diseases, for reduction of the amount and the beam of radiation to a minimum consistent with efficiency and for especial care with patients occupationally exposed to radiation. Vigilance is always needed in the field of radiation, and this handbook brings practical advice and timely warning.

SALT SUBSTITUTES AND LITHIUM POISONING.

LITHIUM CHLORIDE has been put forward as a salt substitute for use with diets from which sodium chloride is partly or completely absent. From the point of view of palatability it is apparently satisfactory, as it has a taste similar to that of table salt, but serious doubts have been recently raised as to its safety. Four separate communications on the subject have appeared simultaneously.[1] In the first of these, A. C. Corcoran, R. D. Taylor and I. H. Page report seven cases of lithium intoxication, in two of which they feel that the intoxication was probably a contributing cause of death. At first it was not quite appreciated just what was happening, but the evidence seems clear enough that lithium was primarily responsible for the effects observed, and not sodium depletion; on the other hand, sodium depletion apparently increased the susceptibility to intoxication from orally ingested lithium salts. The symptoms observed were, in order of appearance, tremor, muscle twitches, apathy, difficulty of cerebration, blurring of vision, confusion and finally coma, and in two cases of the seven, death. Objective effects were reflex hyperirritability, muscle fasciculation and hyperirritability of muscles to galvanic stimulation. These symptoms and signs are not unlike those described by S. A. Cleaveland in 1913, when he reported[2] an experiment in lithium intoxication which he performed on himself. The most notable point is that the amount of lithium chloride taken by Cleaveland in one day was much greater than that ingested by the patients discussed by Corcoran and his colleagues, a point which strongly supports the suggestion that sodium depletion increases susceptibility to lithium intoxication. Another point which may be significant is the fact that, among the seven patients, those who showed severe manifestations had advanced cerebral arteriosclerosis.

In the second report, L. W. Hanlon, M. Romaine, F. J. Gilroy and J. E. Deitrick discuss four cases in which lithium chloride caused toxic effects of the type already described. In one case the patient, who was in "a precarious state of cardiac decompensation", ingested an excessively large amount of lithium chloride in his diet and the opinion is offered that this contributed to, if it did not actually cause, his death. Two important points are brought out in this paper: firstly, that although small amounts of lithium chloride may be taken by many patients without apparent harm, there is a real possibility that patients whose salt intake is restricted may use dangerously large amounts of lithium to satisfy their craving for salt; secondly, that it is difficult to counter the toxic effects of lithium in a patient already severely ill and no means is known of hastening its excretion from the body.

[1] *The Journal of the American Medical Association*, March 12, 1949.
[2] *The Journal of the American Medical Association*, March 8, 1913.

The third report, presented by R. L. Stern, concerns an elderly male patient who was undergoing normal convalescence. He had arteriosclerotic heart disease with slight cardiac hypertrophy and moderate congestive cardiac failure. He was found during convalescence to have slight œdema of the feet and an increase in congestion at the bases of the lungs, and was given therapy to eliminate excess body fluid as well as a diet of low sodium content and a lithium chloride preparation as a salt substitute. He developed signs of lithium poisoning and very nearly died; on withdrawal of the lithium preparation and administration of adjuvant therapy he recovered rapidly and completely.

Finally, A. M. Waldron, in a letter to the journal in the same issue as the other three contributions, refers to four patients who developed effects of the type we have mentioned as a result of ingestion of a salt substitute containing lithium chloride. The symptoms disappeared after withdrawal of the salt substitute and did not recur. Waldron emphasizes, as do all the other investigators, the need for the practitioner to be aware of the toxic effects of lithium and to be on the lookout for them. Other salt substitutes are not without their hazards; some, for example, contain potassium, which may be toxic to patients with renal insufficiency, but lithium chloride appears to present an important problem. It seems reasonable to suggest not only that physicians should exercise care and constant supervision when it is in use, but that they may well think twice before prescribing it at all. Many patients virtually deprived of salt become remarkably tolerant of their insipid diet.

BIBLIOGRAPHIC REFERENCES.

A CHANGE is being introduced in the method of presentation of bibliographic references to articles published in this journal. The change is almost entirely concerned with the order in which the data are to be presented. The order used will be that adopted by the Harvard System, a system which has been widely used in Great Britain and America. Many journals which adopt the Harvard System also use the abbreviations of the "World List". In accordance with the policy of this journal not to use abbreviations, the names of journals will, as heretofore, be printed in full. The custom of publishing the full title of an article referred to in a reference will still be followed. This has for many years been found a useful practice in this journal. It is appreciated particularly by readers who are searching for information on a particular subject—they can generally tell at a glance whether the reference in question is likely to be of use to them or not. That the inclusion of titles of articles is useful is shown by the fact that a list was recently compiled of some thirty medical journals which adopt the practice. The order in which the information is stated is set out every week in the "mast-head" over the leading article. An example may be given:

> Shaw, W., and Dastur, B. (1949), "The Association of Certain Ovarian Cells with Endometrial Cancer", *British Medical Journal*, Volume I, page 113.

In the text of the article "superior numerals" will as a rule not be used. In their place the year of publication will be given in parentheses. When the name of the author does not appear in the text it will be included in the parentheses with the year number. The following is an example:

> Shaw and Dastur (1949) have recently discussed the association of certain ovarian cells with endometrial cancer.
>
> Among recent articles is one (Shaw and Dastur, 1949) on the association of certain ovarian cells with endometrial cancer.

As a rule the names of authors will be printed in the reference column in alphabetical order. Unfortunately there will be a transition period because of certain difficulties in typesetting, but the change will be completed as soon as possible.

Abstracts from Medical Literature.

OBSTETRICS AND GYNÆCOLOGY.

Fœtal Mortality and Morbidity in Cæsarean Section.

S. PEDVIS, J. K. L. IRWIN AND N. W. PHILPOTT (*Surgery, Gynecology and Obstetrics*, January, 1949) review fœtal mortality and morbidity in cases in which Cæsarean section was performed at the Royal Victoria Hospital, Montreal. In all 357 infants were studied; there was a gross mortality of 7·3% and the morbidity was 11·2%. Of the fœtal deaths prematurity accounted for 15 or 36·6% and atelectasis for 12 or 29·3%. Disproportion was the principal indication for section and the fœtal mortality was high owing to the maternal complications which necessitated the operation. Thirteen or 50% of the fœtal deaths occurred in those cases in which *placenta prævia* was the indication for operation. Premedication in the form of morphine, heroin or ephedrine appeared to have an adverse effect on the fœtus, but the difference was only slight. Spinal anæsthesia, which was used in 96 cases, did not appreciably affect the fœtal mortality, but lowered the maternal morbidity and mortality. In view of the high fœtal mortality and morbidity rates, particularly as a result of atelectasis, the following routine is recommended in the handling of infants delivered by Cæsarean section: (i) Have a pædiatrician present to receive the infant from the obstetrician. (ii) Place the infant in a warmed crib and cover it with a previously warmed blanket. (iii) Hold the infant perpendicularly with the head down for twenty to thirty minutes. Oxygen can be given by mask at the same time. (iv) Aspirate the mucus and amniotic fluid from the nose, mouth and pharynx. (v) Administer oxygen intermittently by a mask. (vi) Perform routine care, such as the administration of vitamin *K* and treatment of the eyes. (vii) Return all infants to the "premature ward", tilt the crib to an angle of 45° and place the infant in the crib so that the head is at the lower end for a period of twelve hours.

Non-Invasive Cervical Carcinoma.

G. A. GALVIN AND R. W. TELINDE (*American Journal of Obstetrics and Gynecology*, January, 1949) state that the histological picture of intraepithelial carcinoma or "carcinoma *in situ*" has become reasonably familiar to all those interested in gynæcological pathology. The cellular changes are identical with those of metastatic and invasive cancer. They believe that cervical carcinoma begins in the basal layer of the *portio vaginalis* and that all gradations of basal cell hyperactivity are seen up to the stage at which the entire thickness of the epithelium is taken over by it, when the picture becomes identical with "carcinoma *in situ*". The authors have observed basal cell hyperactivity blend histologically into full-blown intraepithelial cancer so often as to be chiefly concerned over its significance. The questions which arise are: (i) Does intraepithelial cancer always begin as basal cell hyperactivity? (ii) Does basal cell hyperactivity always progress into intraepithelial cancer? (iii) May basal cell hyperactivity remain constant indefinitely or may it sometimes regress? From a practical point of view the authors regard basal cell hyperactivity as a warning calling for repeated biopsies until such time as carcinoma can be proven to exist or not. The more practical problem concerns itself with the relation of intraepithelial cancer to invasive cancer. Since 1940 the authors have diagnosed carcinoma *in situ* by biopsy 75 times, and from a study of these cases conclude that the lesion should be considered as a histological diagnosis indicative of one of three clinical possibilities: (i) That the biopsy has been taken from the periphery of an advanced cervical cancer. (ii) That microscopic invasive cancer is present elsewhere in the cervix, as in 55 of the 75 cases. (iii) That only carcinoma *in situ* is present and no invasion has taken place, as in 20 of the 75 cases. Clinically the surface lesion appears to be relatively dormant for years before blossoming forth as clinical cancer, the average age being 37·1 years, compared with an average age of 48 for gross clinical cervical cancer. The authers suggest that the lesions are an early stage of true cancer rather than "precancerous". Although the majority of the cervices examined showed abnormal appearances, none of them presented clinical evidence of cancer; seven with invasive cancer appeared normal. Almost all of the early lesions arose in the stratified squamous epithelium at its junction with the columnar epithelium. The lesions are often completely asymptomatic, yet 58% of these women had some type of irregular vaginal bleeding. Plugs of carcinomatous tissue were found well up in the cervical canal in three cases. The authors perform a modified Wertheim operation, and report that all of the 67 patients operated upon between January 1, 1940, and January 1, 1948, are living and without recurrence.

Congenital Absence of the Vagina.

A. L. BRYAN, J. A. NIGRO AND V. S. COUNSELLOR (*Surgery, Gynecology and Obstetrics*, January, 1949) assess the various methods of surgical treatment for congenital absence of the vagina and report their results in 100 consecutive cases. They describe a simple and efficient method of creating an artificial vagina employed with uniform success in 14 cases. The Baldwin operation, in which an excised loop of ileum is used, was performed on 14 patients; the authors consider that this operation is difficult, the mortality rate was high (28% in their series), the morbidity rate was high, and subsequent vaginal discharge was often troublesome. Labial grafts and combined labial and thigh grafts have been used since 1904. In the operation of Falls (1940) a skin disk two to three centimetres in diameter is cut at the introitus and after undercutting of the edges the disk is pushed upwards by blunt dissection. Four skin flaps from the vulval opening are taken and sutured to the edges of the disk. Other operations, such as the making of tube grafts from the thigh, require numerous operations and prolonged stay in hospital. An important development was the operation of McIndoe, in which Thiersch grafts are used over a vaginal mould and left in place for three to six months. Frank found that operation to construct an artificial vagina was unnecessary in some cases; persistent pressure of graduated tubes inward against the perineum for half an hour twice daily was capable of making a permanent vagina sometimes attaining a depth of three inches. The operation described by the authors depends on the fact that there is an inherent ability of the newly formed artificial vagina to epithelialize itself. A transverse incision is made at the new site of the vagina, well away from the urethra, and the tissue of the recto-vesical septum is separated by blunt forceps in the fascial plane between bladder and rectum. The peritoneum of the *cul-de-sac* is demonstrated and elevated. This canal is kept patent by the extended use of a non-irritating vaginal mould and allows epithelial buds in the tract to proliferate and line the new vagina. The authors stress the need for the wearing of the mould for six months or longer until the contractile phase has passed. The operation is technically simple, uniformly good results have been obtained, and the mortality rate was nil. Among patients in this series who underwent abdominal section, only four of 26 patients had anatomically normal ovaries, tubes and uterus. Forty-one of these 100 patients were investigated urologically and 21 were found to have abnormalities of the urinary tract, such as solitary kidney, pelvic kidneys and fused kidneys.

Utero-Tubal Insufflation.

I. C. RUBIN (*The Journal of Obstetrics and Gynæcology of the British Empire*, December, 1947) supports the use of utero-tubal insufflation with carbon dioxide gas against other procedures, particularly utero-salpingography with iodized oil. With gas the only pain produced is shoulder pain, no residue is left in the Fallopian tubes to induce permanent occlusion in stenotic tubes, and the test for therapeutic purposes can be repeated. The author also claims that by careful observation of the radiation of the pain he can diagnose the site of the tubal occlusion. The hazards following oil injection are far greater than those following gas—a rate of infection of 1:230 in the former against 1:1705 in the latter. No deaths have occurred following insufflation with carbon dioxide, but only when air or oxygen was used. With the attachment of a kymograph, differentiation can be made between patency and non-patency, stenosis, spasm, and muscular atonia of the tubes. The therapeutic action of insufflation is difficult to explain, and the author states that it establishes the patency of the genital tract from the external os of the cervix to the fimbriated end of the Fallopian tubes. The cannula acts as a mechanized dilator in narrow cervical canals, and insufflation sometimes dislodges a mucus plug. In the tubes inspissated mucus may be dislodged, agglutinated folds separated and perifimbrial adhesions broken through. A possible psychosomatic effect cannot be ignored. Within certain clinical and pathological limits all Fallopian tubes fall into three groups: (i) normally patent tubes, (ii) non-patent tubes, (iii) intermediary. With adequate pressures those in the second group may be advanced to the third and first groups and those in the third group may be readily restored to the first group, that is, to normality. In an analysis of 590 pregnancies preceded by insufflation the

author found that insufflation increased the patient's chance of conception many-fold over her normal statistical chance. In 386 or 65·42% insufflation was the only form of treatment employed; 274 patients, or 46·44%, showed evidence of impaired tubal patency, and in the 118 cases in which the tubes were strictured, pregnancy was achieved in 31%. Out of 573 patients, 228 or 38·64% became pregnant within two months after insufflation. In comparison with surgical procedures, in which there is a 6·6% chance of pregnancy, insufflation in the author's hands has a 15·07% pregnancy rate. When other therapeutic physical and hormonological adjuvants are added to utero-tubal insufflation the salvage may be appreciably improved.

The Obstructed Uterine Cervix.

G. F. MELODY (*Surgery, Gynecology and Obstetrics*, January, 1949) reviews the general subject of the obstructed uterine cervix and discusses its ætiology, treatment and prevention. He states that complications of cervical obstruction cause a diversity of symptoms and are encountered in women of all age groups; probably less than 10% are congenital in origin. Incomplete canalization of the distal extremities of the fused Müllerian ducts and congenital hyperplasia of the longitudinal cervical ridges are the outstanding congenital causes. Infection, either acute or chronic, is an important cause of acquired cervical stenosis. Acute infectious diseases, such as diphtheria, scarlet fever and smallpox, are to be considered, but injury and infection at childbirth or abortion are more important. Gonococcal cervicitis, tuberculous endometritis and syphilitic stricture of the cervix are ætiological factors. Trauma in various forms, ranging from injury during simple dilatation and curettage to extensive damage at childbirth, is an important cause. Cauterization of the endocervical canal is the most important single cause of stenosis due to trauma. Operations on the cervix can be followed by stenosis and an incidence of 9% of cervical stenosis is reported after conization of the cervix. Stricture of the cervical stump may cause an abscess or cervical pyometra. The topical application of strong caustics, the continuous wearing of stem pessaries, radiation by radium or deep X-ray therapy, neoplasms, simple and malignant, and senile contracture are possible causes of cervical stenosis. Injury of the cervix during delivery followed by infection is the most common cause of cervical stenosis with hæmatometra. The indiscriminate use of œstrogens for post-menopausal women who have a closed cervix often activates the endometrium and results in hæmatometra. The signs and symptoms of stenosis are variable and depend largely on the cause of obstruction, the degree of obstruction, the age of the patient and the nature of the retained secretions. Profuse leucorrhœa is the commonest symptom. Cervical occlusion is a common cause of infertility. The frequency of pregnancy following tubal patency tests may often be due as much to the effect of cervical dilatation as to investigation of the utero-tubal system. Hæmatometra following cervical obstruction is encountered more frequently nowadays as a result of cervical cauterization, the frequent employment of conization, and the not infrequent employment of radiation therapy. Gradual dilatation sometimes followed by the insertion of a stem pessary for three to six weeks is the usual method of treatment for cervical stenosis. When gradual dilatation is impossible anterior lip bisection, vaginal myomectomy or hysterectomy by the vaginal or abdominal route may be necessary. Prevention of cervical stenosis is of outstanding importance and a plea is made for the avoidance of trauma to the cervix in all obstetrical and gynæcological practice.

Vaginal Operations for Cystocele, Prolapse of the Uterus, and Stress Incontinence.

WILFRED SHAW (*Surgery, Gynecology and Obstetrics*, January, 1949) reviews the anatomy concerned in, and technical minutiæ of, operations for cystocele and uterine prolapse. Of prime anatomical importance is a specialized condensed layer of fascia lying deep to the vaginal wall between the submeatal and transverse vaginal sulci. The author calls this "the posturethral" ligament; it extends from the pubic ramus of one side below and behind the urethra and the neck of the bladder to the pubic ramus of the other side, forming a dense sheet of tissue supporting the urethra and the bladder neck. The ligament consists mainly of plain muscle tissue, and if tissue is lost it stretches, leading to urethrocele and contributing to cystocele. The vesico-cervical ligament passes from the vesical fascia to the cervix and consequently fixes the bladder to the cervix. When this ligament is divided the bloodless vesico-cervical space is found. The identification of this space is one of the most important steps in the operations for prolapse. In operations for cystocele the objects are first to mobilize the bladder and return it to its normal position, and secondly to close the area between the upper border of the post-urethral ligament and the cervix so that the bladder will not prolapse again. Vaginal wall or endopelvic fascia is too weak for this purpose, so the author closes the space by suturing the posturethral ligament directly to the cervix by a stitch passing through the vaginal wall on one side, vaginal fascia, posturethral ligament and through the vaginal wall on the other side. When recurrence takes place with stress incontinence the author has never been particularly impressed with the Stoeckel-Gobell or Aldridge operation because the fascial strips which act as a sling are too narrow. He has therefore attached a strip of *fascia lata* between the anterior vaginal wall and the urethra, supporting the two ends of the strip by boring two holes in the pubic bones and suturing together the two ends of the fascial strip in the front of the *symphysis pubis*. The *fascia lata* strip is fashioned so that it has a broad middle piece which can be sutured in place in such a way that it lies along the whole length of the urethra. The author states that 25 patients have been operated upon in this way with extremely satisfactory end results.

Repair of Cystocele and High Rectal Prolapse with Total Hysterectomy.

M. WEINSTEIN AND M. ROBERTS (*The Western Journal of Surgery, Obstetrics and Gynecology*, January, 1949) consider that the usual total hysterectomy operation tends to improve the support of the pelvic organs by strengthening the pelvic floor. This principle can be used in the intra-abdominal repair of cystocele, high rectocele and enterocele during the operation of total abdominal hysterectomy. The uterus is removed on standard lines and no attempt is made to attach the stumps of the divided round and utero-sacral ligaments to the vaginal suture line. Even though the cervix is removed, much of the tissue and fascia which held it in place is still present. After total hysterectomy the vaginal recesses, the anterior, posterior and lateral fornices, have been obliterated and a variable amount of the anterior and posterior vaginal wall has been removed, the antero-posterior diameter of the pelvic floor being shortened. The posterior portion of the bladder is now in a new position on the pelvic floor and is less likely to prolapse. When cystocele is present further shortening and strengthening of the lax upper half of the anterior vaginal wall is necessary. A V-shaped segment of the anterior vaginal wall is excised with the base of the V about four centimetres in length and the apex extending under the dissected bladder. This is now sutured with side-to-side chromicized stitches and the usual antero-posterior closure of the vagina is performed. When high rectocele is present the *cul-de-sac* and pararectal fossæ are found to be deeper and the pelvic peritoneum in the recto-uterine region is thickened, loose and mobile. When enterocele is present there is herniation of a sac pushing into the vagina between the cervix and the rectum without bulging of the rectum into the vaginal canal. High rectocele and enterocele are dealt with by elimination of the deep *cul-de-sac* and the pararectal recesses. Many fine silk sutures are inserted alongside each other before the peritoneum of the pelvic floor is sutured. These sutures begin posteriorly in front of the sacral promontory at the level of the pelvic brim and plicate the peritoneum of the floor of the *cul-de-sac* and terminate anteriorly in the region of the vaginal suture line. Sufficient sutures are used to obliterate all deep spaces of the pelvic peritoneum. The final result is an obliteration of all the pelvic spaces, fixation of the upper part of the rectum and a new, high pelvic floor.

SURGERY.

A New Forceps for Bronchoscopic Biopsy.

C. CRAFOORD (*The Journal of Thoracic Surgery*, February, 1949), speaking in a discussion of the cytology of the bronchial secretions, stated that the Swedish pathologists were always very cautious about stating whether or not cells in smears made from sputum were malignant. Because of this he and his colleagues had tried as far as possible to get bronchoscopic biopsy specimens for them. By passing specially constructed, thin, flexible bronchoscopic biopsy forceps out into the small bronchial branches with radiological guidance it had been found possible to get small pieces of tissue from diseased areas which were often far beyond the field of vision of the bronchoscope. Thus "positive biopsy answers" were obtained in about 80% of cases of carcinoma of the lung.

Special Abstract.

AIR HYGIENE.

IN November of last year a paper by Professor Sydney D. Rubbo on the problem of infection in hospitals was published in this journal. The author dealt *inter alia* with the use of ultra-violet light and of aerosols to overcome droplet infection. It will also be remembered that in 1946 Miss Phyllis M. Rountree and Dr. Jean Armytage discussed in this journal blankets as a source of infection and that Miss Rountree subsequently described results obtained by the treatment of blankets with an oil emulsion and a solution of "Fixanol C". An important contribution to the subject of air hygiene has recently been made by a number of workers headed by R. B. Bourdillon,[1] their investigations being described in number 262 of the Special Report Series of the Medical Research Council of Great Britain. In the preface which emanates from the Medical Research Council it is stated that certain aspects of the subject have not been dealt with in any detail in the report. These include the use of triethylene glycol as an air disinfectant and the oiling of blankets to reduce the scatter of air-borne organisms. At the same time the Medical Research Council regards the report as a landmark in the study of air hygiene.

The studies are grouped under four main headings, as follows: (i) Methods of sampling air for bacteria, including methods for testing the efficiency of air disinfectants. (ii) The various methods of disinfecting air, and the conditions determining their effectiveness. (iii) Measurement of the contamination by living organisms of the air in factories, naval vessels, hospitals, operating theatres, air-raid shelters and other places. (iv) A few studies on the transmission of air-borne infection in animal experiments. Many of the chapters or sections are extremely technical and will be of practical interest only to those engaged in research or in attempts to carry out disinfection of air. The present intention is to bring to the notice of readers some only of the investigations that have been carried out and their possible usefulness. In the chapter on general conclusions from which most of this information may be gleaned, R. B. Bourdillon points out that the problem of air disinfection is complex owing to the wide variety of conditions which are concerned. He adds that it is fairly easy to produce sterile air in a small unoccupied cabinet, but impracticable to produce it in a London street or a large factory. At the same time the present standards of air hygiene are so low that it is generally easy to select methods which will bring about a marked improvement in any given situation without excessive expense. This is one side of the picture. The other is seen in the Medical Research Council's preface, where it is stated that it is natural to ask what are the implications of the work set out in the report and to what extent improved standards of air hygiene may be expected to result in improved health. We are reminded that these questions are not at present easy to answer and that there is still much obscurity about the mode of transmission of "air-borne" disease. We are also told that it must not be assumed that an unselective reduction in the number of bacteria in the air of buildings where healthy people congregate will necessarily be matched by a lessened incidence of overt infections.

Bourdillon states that it is often argued that it is unwise to disinfect air for fear of lowering people's immunity to such a point that they may become unduly liable to respiratory infection when they do meet it. He mentions arguments that have been advanced in favour of and against this view, and he refers to experimental observations on animals showing that the severity of infections and the mortality among them depend directly on the dose inhaled. He concludes that it is worth while reducing the level of air contamination and that this will cause some reduction in the number of cases of obvious respiratory disease, some reduction in their severity and, where large numbers are concerned, some reduction in the number of deaths from respiratory disease.

Instruments Used.

In most of the instruments used for the sampling of air for bacterial estimation air is sucked at high velocity through a narrow slit and it then impinges on a plate of culture jelly. While the sampling is being carried out the plate is moved past the slit at a known speed. With this method the organisms are distributed over the plate and it is possible to determine precisely the moment at which any particular organisms were collected. It is concluded that samples collected on a plate of culture jelly are best for accurate timing, but that when it is necessary to measure the total number of bacteria present, rather than the number of bacteria-carrying particles, it is preferable to make the collection into a liquid medium instead of onto a jelly.

Methods of Air Disinfection.

Disinfection by Daylight and Sunlight.

Of the various methods of air disinfection, the first that is mentioned is disinfection by daylight and sunlight, which are useful even after they have passed through ordinary window glass. The provision of large windows in houses and elsewhere does lower the mean content of air-borne and dust bacteria and so is of real benefit.

Natural Ventilation.

Natural ventilation is an admirable means of air disinfection when it can be provided without the production of objectionable chilling or draughts. It is most difficult when it is most needed, and is often unreliable because of the habit that people have of closing windows.

Mechanical Ventilation.

Mechanical ventilation is costly, but is reliable when the necessary apparatus is properly installed. Unless provision is made for the heating of incoming air in cold weather, inlets are apt to be blocked by those who dislike draughts. It is stated that for many purposes a plenum system drawing air from the roof through filters can be strongly recommended. Examples of places named as suitable for this system include operating theatres, sterile rooms and most buildings in which natural ventilation is inadequate. If such a system is properly installed, it is possible to dispense with natural ventilation altogether. This may be undesirable. In many buildings mechanical ventilation systems have the disadvantage that the air flow may be interrupted, or even locally reversed, by the opening of windows in one or two rooms. Hence windows are often permanently sealed or locked. This is a drawback because it is an advantage to be able to open windows widely, both in hot weather and during especially dusty operations when a high ventilation rate is desirable for the staff employed. The difficulty can be avoided by the installation of fans which give a relatively high air pressure in the main ducts and an orifice plate or other fixed constriction in each branch duct, so as to limit the maximum flow to any one room. This type of ventilation will increase the first cost and also the power consumption. The degree of filtration needed depends on circumstances. Coarse filtration is inexpensive and is usually worth while, at least in large towns, to exclude insects and large dirt particles. For so-called sterile rooms and certain operating theatres *et cetera* fine filtration is justified, although it increases both initial and running costs. The air intake should always be placed as high above ground level as possible. Clearly the quantity of air needed to cause an appreciable lowering of the mean bacterial content depends chiefly on the amount of movement and the degree of crowding of the space concerned. It is estimated that in general not less than four air changes per hour are advisable and it is usually difficult to provide much more than ten changes per hour.

Recirculation of Air Through Cleaning Plants.

An account is given of studies made on the disinfection of air by recirculation through cloth filters and past ultra-violet lamps. The merits and limitations of the method are stated. The chief merit is that by the use of simple filters separate units can be installed relatively cheaply, without the expense of ducts or the cost of heating large volumes of air. If a mechanical ventilation system is used, recirculation can be economically combined with the fresh air system. Though the combination is widely used in large buildings, the opinion is expressed that it is desirable only when proper precautions are taken to clean the recirculated air. Another advantage of recirculation through filters is that the filters easily remove the large, coarse bacteria-carrying particles on which the bacteria are hard to kill with ultra-violet light or chemical agents, and they remain efficient at all degrees of humidity. To provide a relatively high intensity of ultra-violet radiation in the circulating ducts is simple, and it is thought that in this way small filter-passing particles may be dealt with as well. It is pointed out that recirculation has one severe limitation when compared with chemical disinfection or with ultra-violet radiation under

[1] "Studies in Air Hygiene; Privy Council, Medical Research Council Special Report Series, Number 262", by R. B. Bourdillon, O. M. Lidwell and J. E. Lovelock, with W. C. Cawston, L. Colebrook,, F. P. Ellis, M. Van Den Ende, R. E. Glover, A. M. Macfarlan, A. A. Niles, W. F. Raymond, E. Schuster and J. C. Thomas; 1948. London: His Majesty's Stationery Office. 9½" × 6", pp. 360, with 104 illustrations Price: 7s. 6d.

conditions favourable to its action. This is that high rates of recirculation are difficult to achieve without serious expense, and involve either bulky or costly trunking, or the inconvenience of draughts, fan noise, and units of considerable size in the space concerned. It is easy to recirculate up to five turnovers per hour provided that the slight fan noise from the recirculation unit is tolerable, or if the unit is installed as part of a more extensive ventilation plant. On the other hand ten turnovers per hour are not easy to provide without expense, noise or draughts. Since chemical disinfectants or ultra-violet radiation can easily be applied to give much higher killing rates for freshly sprayed bacteria-carrying particles or viruses, it is evident that simple recirculation plants *per se* are not likely to be as efficient during acute respiratory epidemics as other means of disinfection, provided that the latter are adequately applied.

Ultra-Violet Radiation.

It is pointed out that the conclusions reached in regard to ultra-violet radiation agree largely with those of other workers. In spite of the fact that the practical results of ultra-violet radiation in field trials are not yet fully established, the following conclusions are regarded as justified in regard to the use of lamps screened from direct vision so that the occupants of rooms need not wear glasses.

1. Ultra-violet radiation is cleanly, free from toxic effects, safe if properly installed, and easy to maintain.
2. The first cost of installation is considerable, and, although the power consumption is very small, lamp replacement costs are serious if irradiation is used on a large scale.
3. Considerable care in installation is needed in order to secure a maximum effectiveness without risk of causing conjunctivitis. A small change in the design and positioning of reflectors may cause a big fall in efficiency. The effect of dust on lamps in the lowering of efficiency is still uncertain, but the dusting of lamps and reflectors at specified intervals is desirable.
4. In contrast to chemical air disinfectants, ultra-violet radiation is most effective at low relative humidities. Thus ultra-violet radiation may have an advantage over chemical agents at low humidities, while the chemicals may be preferable at high humidities.
5. Owing to its relative inefficiency for large particles, ultra-violet radiation will probably be of greatest value when it is combined with some measure of dust control, such as the oiling of floors, or where practicable, the oiling of clothes or blankets as well as the oiling of floors. This conclusion, it is stated, is not intended as disparagement of its possible value when dust control is impracticable.
6. With screened lamps the efficiency may be largely governed by the rate of vertical circulation of the air in the room.

Chemical Disinfection.

High disinfection rates can be obtained with certain chemical substances vaporized or sprayed into the air of a room, although the effects on the larger dust-borne particles are much more slowly obtained than those on fine particles. The chemical methods at present available may best be applied in special situations (for example, in rooms where especially clean air is needed or where abnormal sources of contamination are present) and during epidemics of air-borne disease. Most chemical methods of air disinfection need some daily or weekly attention and are apt to become unsatisfactory if neglected.

There are many suitable chemicals and means of dispersal. It is difficult to establish without doubt the complete harmlessness of an aerial bactericide. Consideration of the nature of the material and animal experiments both by ingestion and by inhalation are desirable preliminary steps. It is pointed out that the concentration at which most bactericides are used is below that at which many of even the most poisonous gases cease to be dangerous. Few bactericides have been proposed for use at concentrations exceeding 0·1 microgramme per cubic foot of air. This is close to the concentration at which both chlorine and phosgene can be tolerated indefinitely, while nearly ten times this amount of hydrogen cyanide is needed to produce any physiological effect.

In regard to offensiveness, the initial reaction to different odours may be very varied, but in general any pronounced smell becomes objectionable after a time. However, some substances such as the hypochlorites fatigue the olfactory nerve endings rapidly, and a smell which is pronounced when one enters a room, becomes imperceptible after some minutes.

In regard to irritation, it is noted that particulate mists are especially liable to irritate the throat and to produce coughing. There is considerable variation in the threshold concentration to which different persons respond.

The methods of dispersal discussed include spraying, vaporization by heating and vaporization at or near room temperature.

Many aerial disinfectants were investigated. The findings in regard to 37 are set out in a table. Those described as outstanding are: hypochlorous acid, triethylene glycol, lactic acid and other α-hydroxy acids, resorcinol and alkylresorcinols. Each has special merits for different situations. Thus, hypochlorous acid is very cheap and could be used all over the country in the event of a national emergency. Triethylene glycol, though hard to obtain in Great Britain, is efficient and wholly non-irritating. Lactic acid is easy to obtain and retains much of its efficiency in fairly dry atmospheres. While irritant in excess concentration, it is quite harmless after absorption; α-hydroxy-α-methylbutyric acid is less irritating in excess and is easier to volatilize than lactic acid, but is not at present available commercially. Resorcinol is wholly non-irritant, and is easy to vaporize and to purchase. It is especially suitable for single or intermittent short periods of air disinfection, but its rapid disappearance after vaporization makes it less suitable for continuous disinfection.

The maintenance of effective concentrations of chemical disinfectants in the air is of the utmost importance. In regard to this problem it is necessary to decide whether the object of air disinfection is the killing or the attenuation of air-borne organisms. Twort *et alii* are quoted as having stated that the ideal is the attenuation and not the killing of the pathogenic organisms. While attenuation presumably needs lower concentrations of disinfectant than killing, Bourdillon and his colleagues think that killing or removal of air-borne bacteria should be the goal of air disinfection, instead of the very uncertain process of attenuation. The greatest difficulty in the maintenance of effective concentrations of chemicals in the air is the variable rate of ventilation in most occupied rooms. With a constant rate of emission of a bactericidal there may thus be an excess concentration when doors are shut and too low a concentration when they are open. Automatic apparatus has been devised to overcome this difficulty, but it is costly and needs maintenance. The hope is expressed that aerial germicides which give an effective, but non-toxic, concentration of vapour at normal room temperature, will offer a good solution to this problem; it is stated, however, that further study is needed on the behaviour of these substances under practical conditions. A second difficulty in the maintenance of effective concentrations of chemicals in the air is the fact that many chemicals are unstable in the air, or are affected by dust or the surfaces of walls and solid objects, either by chemical action or by condensation and adsorption. Hence they may disappear rapidly, as tends to occur with hypochlorous acid and resorcinol. A third difficulty is that most air disinfectants have rather a small ratio between irritant or toxic concentrations and effective killing concentrations.

As a result of the factors named, chemical disinfection requires care and skill in installation, if it is to be efficient and free from undesirable effects. However, during epidemics and when special sources of contamination make rapid disinfection important, as in certain bacteriological and industrial work, a chemical method may prove far more efficient and satisfactory than any other.

For the dispersal of disinfectant, vaporizers are usually the most convenient, but in some cases power-driven sprays may be preferred. In most situations the use of a fan is essential in order to distribute the vapour or spray.

Hand sprays are mentioned. They are often used, in places where people congregate, in such a way that no appreciable benefit can result. Useless substances are sometimes sprayed. For example, formaldehyde is used with its odour disguised by a fragrant essential oil. Formaldehyde is effective only in concentrations which are highly irritant to the human respiratory tract. Hand sprays have a real field of usefulness in air disinfection, provided they are used in adequate numbers and with efficient liquids. Thus it is possible to disinfect by hand sprays alone air that is infected with freshly sprayed moist organisms, such as those in sneeze droplets. Owing to the labour involved in their use, hand sprays are unsuitable for routine use in ordinary conditions, but their cost is small and they can easily be held in reserve for emergency use in epidemics of respiratory disease. One of the greatest merits of hand sprays is that when a liquid is sprayed, of which an overdose is irritant, there is no danger of getting too high a concentration, since the person working the spray is one of the first to start coughing.

Sterilization by Heat.

In regard to sterilization by heat, the opinion is expressed that when complete sterilization of air is important, the use of a furnace is the best of all methods, provided the

volume of air is not excessive. For large volumes of air the cost in energy becomes appreciable. Tests of sterilization by heat are described and in these two types of furnace were used—externally heated furnaces and furnaces with internal heating. Details of the tests are given and the results are compared with those of other workers.

Dust Control.

The importance of dust control is emphasized—when infectious disease is present, dust may contain very large numbers of pathogens. Apart from methods of ventilation and air disinfection, several specially efficient procedures are discussed. The first is the avoidance of sweeping with a dry brush. When practicable vacuum sweeping is much preferable to dry brushing, although the ordinary sweeper dust bag is said to allow the passage of many bacteria through its walls. When vacuum sweeping is impracticable sweeping with a wet brush, or with an oiled brush, or with moist or oiled sawdust, is much better than dry sweeping, provided that water or oil can be used without the causation of much damage. On asphalt or stone floors sweeping with sawdust moistened with calcium chloride solution has been recommended.

The second procedure discussed is the coating of floors with a dust-laying compound. For floors of wood or linoleum spindle oil is excellent, provided local conditions do not make it intolerable. Its chief drawback is that small quantities of oil tend to adhere to any object dropped on the floor and the footgear of persons walking on it.

The third procedure is the oiling of textile materials during laundering. This is the work described by Rountree and others. The opinion is expressed that some process of this type may become widely applied, both in laundering and in the dry cleaning of clothes.

Masks.

Masks are discussed. It is stated that while not strictly a means of air disinfection, the use of masks for the prevention of air pollution and for the protection of individuals is worth more attention than it receives in ordinary life. The wearing of masks is often worth while in domestic houses in reducing the tendency for each member of a family to catch influenza in turn.

Conclusions.

The subject of air hygiene is developing so rapidly that detailed conclusions are apt to be out of date by the time they are printed. The following conclusions appeared to be justifiable when this report was written in August, 1946.

1. One of the greatest obstacles to air disinfection is that people lose interest in it, and cease to take care of any plant that is installed for the purpose (except in special situations where the danger of neglect is very obvious). Hence it is often wise to use a number of methods which, although only partially effective, are automatic and trouble free, and to reserve the more troublesome methods for especial situations and for epidemics, or for the appearance of infectious illness in a home.
2. Thus, domestic bedrooms should where possible be designed with large windows to admit plenty of daylight, and with flues of area adequate to give good natural ventilation. When infectious illness is present, further measures such as chemical or ultra-violet disinfection of the sickroom, or the wearing of masks by those who attend on the invalid, can be adopted as temporary measures—provided that the necessary preparations have been made in normal times.
3. Again, in large offices good ventilation, good lighting and dust control are worth while as permanent measures. Air disinfection by chemicals or ultra-violet radiation is worth adding when an epidemic is prevalent.
4. In special situations where really clean air is needed, it can be obtained by one or other of the methods described in this report.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held at the Children's Hospital, Carlton, on June 8, 1949.

Early Symptoms and Diagnosis of Inhaled Foreign Body.

DR. RAYMOND HENNESSY discussed the early symptoms and diagnosis of inhaled foreign body. He said that like a certain famous person's knowledge of London, the symptomatology of inhaled foreign bodies was extensive and peculiar. Nevertheless increasing opportunities of observing patients with that condition had shown that the common factor was some degree of obstruction of the air passages affecting the larynx, trachea and bronchi. The obstruction might be very slight or absolute.

Foreign Bodies Lodged in the Larynx.

Dr. Hennessy said that foreign bodies lodged in the larynx fell into three clinical groups: in the first, the foreign body was inhaled through the mouth and lodged in the larynx, and became incarcerated; in the second group the foreign body traversed the larynx and after some hours or days in the trachea or bronchial tubes was coughed into the larynx and became impacted; the third group was due to inhalation of food or material during or after general anæsthesia. If obstruction due to a foreign body in the larynx was absolute, death was almost instantaneous unless the obstruction was immediately relieved by tracheotomy. It was problematical whether death in those cases was due solely to asphyxia or was due to cardiac inhibition following strong stimulation of the vagi caused by laryngeal irritation and over-action of the protective or adductor mechanism. It was well known that people had been revived after immersion or the inhalation of gases or during anæsthesia, although respiration had been in abeyance for many minutes, and in some drowning cases even after one hour.

If the foreign body by size or shape was not completely occluding the aperture, the larynx became remarkably tolerant to its presence. All signs of irritation such as coughing or gagging might rapidly disappear. Dr. Hennessy stated that he had removed a safety-pin which was impacted in a child's larynx for two and a half years. The usual clinical signs of partly obstructing laryngeal foreign body were some alteration in breathing, such as stridor or dyspnœa, perhaps appearing only on exertion, and even more important, some degree of dysphonia or even aphonia. Any coughing was generally croupy in nature. Clinically the diagnosis of laryngeal foreign body closely resembled primary laryngeal diphtheria or acute inflammatory laryngo-tracheitis.

Foreign Bodies in the Trachea.

Foreign bodies in the trachea generally moved about and gave rise to characteristic symptoms caused by coughing when the foreign body hit against the vocal cords and rebounded. That could be heard and felt.

Foreign Bodies in the Bronchi.

Foreign bodies in the bronchi appeared to lodge more frequently in the right lung than in the left. It did not necessarily follow that the foreign body would remain in the first bronchus it entered. Occasionally after some hours or days it would be coughed into another bronchus, and that probably accounted for some of the foreign bodies in the left bronchus. If the foreign body completely occluded the bronchus there was very rapid absorption of air from the segment of the lung distal to it. Obviously that might affect a whole lobe or part of a lobe. If the foreign body was opaque, X-ray examination gave certain evidence of its presence. Even if the foreign body was radio-translucent modern radiography was so accurate that a diagnosis could be made with a high degree of certainty and precision. X-ray evidence of non-opaque foreign bodies depended on the mechanical conditions created by the foreign body and the bronchial tubes. It had to be understood that the bronchial tubes, far from being rigid and immobile, were constantly in movement. The chief movements to be considered were those during inspiration, when the bronchial tube dilated and lengthened, and those during expiration, when the bronchus contracted and shortened. A typical example for consideration was a peanut lodged in the upper main bronchus. On inspiration the bronchus moved away from the peanut and air was admitted into the distal air passages. When expiration occurred the bronchus contracted on the foreign body. Therefore some of the air inspired failed to escape. There was more air taken in at every respiratory phase than escaped. The result was that the lung distal to the foreign body became over-distended through imperfect emptying. That condition was known as obstructive emphysema, and to demonstrate it, X-ray pictures had to be made precisely at the end of expiration and precisely at the end of inspiration. That required much technical skill and experience with small children. The X-ray picture showed that at the end of the expiratory phase the lung which contained the foreign body had more air in it than the other lung. The diaphragm was flattened and the mediastinum was pushed over to the affected side.

A film taken at the end of inspiration showed that the diaphragm had come up, the mediastinum had returned and there was very little difference in aeration of the two lungs.

If the foreign body was not removed the next phase began. A certain amount of swelling of the foreign body and a good deal of swelling of the bronchial mucosa occurred in the vicinity of the foreign body as a result of irritation. Soon therefore the movements of the bronchial tube were inadequate to allow air to pass by the foreign body and a condition of equilibrium was set up in which no air entered or left the segment of the lung distal to the foreign body. Air was absorbed from that segment and, having no outlet, the secretions accumulated. That set up a condition known as a "drowned" or collapsed lung. An X-ray picture showed that the affected side was airless compared with the opposite lung. The mediastinum was sucked over to the affected side and did not move over on inspiration and expiration. If no relief was obtained then the retained secretions suppurated. Peptonization of the lung tissue occurred and a pulmonary abscess developed. With a peanut it usually took about four or five days for a condition of obstructive emphysema to pass into one of "drowned" lung. It must be realized that those changes occurred in the bronchus whether the foreign body was radio-opaque or radio-parent or whatever its nature might be, but it was most characteristic of peanuts, a fact that had been known for about forty years and was first described by an American bronchoscopist, Iglauer. The physical signs elicited on clinical examination were generally those of defective air entry into part or whole of the lung. "Moist" adventitious sounds were commonly heard.

Dr. Hennessy pointed out that foreign bodies lodged in the œsophagus in little babies set up clinical signs which closely simulated foreign bodies in the air passages. It was not very uncommon for infants under the age of twelve months to have a foreign body lodged in the upper third of the œsophagus for several weeks, and the foreign body was often radio-parent. Pressure of the foreign body was transmitted through the posterior tracheal wall and became increased by the inflammatory reaction around the foreign body. Some stenosis of the trachea resulted, causing stridor and dyspnœa. The amount of œsophageal obstruction might be slight and there was no true dysphagia for food, but the secretions tended to be held up and to overflow into the larynx, causing cough. That triad of symptoms, stridor, dyspnœa and coughing, all highly suggestive of some foreign body in the air passages, was actually due to a foreign body in the œsophagus.

DR. CHARLOTTE ANDERSON, of the Clinical Research Unit, gave a review of the early symptoms and diagnosis of inhaled foreign body as seen in the Children's Hospital, Melbourne. During a five-year period from April, 1944, to April, 1949, 52 patients had been treated at the hospital. The youngest was aged eight months and 34 of the 52 were under the age of three years. A very great variety of foreign bodies made classification difficult, but they seemed to be grouped under the following headings: (i) foreign bodies inhaled during eating, 32; (ii) food or other matter inhaled during the course of anæsthesia, 5; (iii) metallic foreign bodies, 9; (iv) miscellaneous group, 6.

Foreign Bodies Inhaled during Eating.

There were 32 patients who inhaled food whilst eating, and in 20 of the cases a peanut was the foreign body. Several important clinical features were noted in that group of patients. Firstly, no less than 30 of the 32 patients had a history of "choking" or "coughing" or some episode of acute respiratory distress whilst eating, followed immediately or shortly afterwards by respiratory symptoms of coughing or wheezing. It was pointed out that a clinical history of that type was very suggestive evidence of inhaled foreign body, and bronchoscopic examination was necessary irrespective of whether there were physical or radiological signs found on examination of the chest. If there were confirmatory physical or radiological signs of pulmonary collapse or emphysema, or of stridor from narrowing of part of the larynx, the trachea or a major bronchus, then one could be certain that a foreign body was present. Conversely, the absence of those signs did not exclude such a lesion and bronchoscopic examination was essential. The second interesting clinical feature was that 12 of the 32 vegetable foreign bodies had been present for one week or more; in one case the foreign body had been present for as long as one year and in another for four months, and in neither patient was there any serious ill health, both patients recovering quickly and completely after removal of the peanut from the bronchus. The third feature was the rarity of any pulmonary infection; it occurred in only two patients—one who had a history of recurrent pneumonia, and the other who had an attack of pneumonia which failed to resolve with chemotherapy.

It might be said that the frequency with which peanuts were inhaled by children under the age of three years clearly indicated that children below the age of three years should not be given peanuts to eat.

Food or Other Matter Inhaled during the Course of Anæsthesia.

There were five patients in the second of the groups suggested by Dr. Anderson. Four of those five patients had respiratory embarrassment whilst "coming out" of the anæsthesia. Three of the five had wheezing and coughing afterwards and two developed acute chest infections. The two points of importance in the group were, firstly, the dangers of giving a general anæsthetic to patients when any food was in the stomach (and it was stressed that a stomach is by no means empty in four to five hours) and, secondly, the importance of having some means of aspirating any vomitus or foreign matter from the pharynx if retching or vomiting should occur during anæsthesia. The means for immediately inspecting the larynx and trachea to remove any inhaled foreign body should always be at hand during any type of general anæsthesia. A recent report by Dr. K. M. Bowden (see THE MEDICAL JOURNAL OF AUSTRALIA, January 22, 1949) bore strong testimony to the need for those simple safeguards.

Metallic Foreign Bodies.

In the group of metallic foreign bodies there were nine patients. Six of them had a typical history of a "choking" or "coughing" attack whilst they had the metallic object in the mouth. Five had symptoms of cough and stridor afterwards and presented no difficulty in diagnosis. Two had recurrent chest infections, and two had no symptoms.

Miscellaneous Foreign Bodies.

Of the miscellaneous group of six patients, four had typical histories of a "choking" or "coughing" spasm followed by stridor and cough. The remaining two patients had no history of inhalation, and both presented with the outstanding feature of recurrent hæmoptysis. Those two patients would be fully discussed by Dr. Southby and Dr. Hagger later in the meeting.

DR. J. G. WHITAKER asked Dr. Hennessy if, when there was a metallic foreign body in the peripheral portion of a lung, he could remove it with the present equipment. He suggested that a thoracotomy might provide the easier approach.

Dr. Hennessy replied that any foreign body in the periphery of the lung was beyond his reach with the bronchoscope.

Recurrent Hæmoptysis from an Inhaled Grass Seed.

DR. ROBERT SOUTHBY presented a patient with recurrent hæmoptysis from an inhaled grass seed. He said that the patient, a male child, aged six years, was admitted to the Children's Hospital in April, 1948. In July, 1947, while the child was in bed for a cold which he had had for five days, he had seemed to vomit a considerable quantity of blood. Over the next three days he had coughed up smaller amounts. He had a high temperature with the cold and was given penicillin in hospital. Since then he had been tired, had lost some weight, and had coughed up blood in small amounts on several occasions. There was no sputum. There was no contact with any person with tuberculosis. On examination the child was a healthy-looking boy with a normal temperature, pulse and respiration rate. Clinical examination did not reveal the presence of any abnormality. X-ray examination of the chest showed an area of opacity in the lower lobe of the right lung posteriorly. There was considerable peribronchial thickening in that area and an adhesion to the dome of the right diaphragm posteriorly. The Mantoux test and Casoni test did not produce a reaction. Bronchoscopic examination did not show any abnormality. The bronchogram showed good filling of the right bronchial tree with localized cylindrical bronchiectasis of the middle basic segmental bronchi of the lower lobe of the right lung. The remainder of the bronchial tree was normal. A diagnosis was made of bronchiectasis, or small chronic abscess with possible foreign body, and lobectomy was considered to be correct treatment. Five weeks later he coughed up a considerable amount of blood again, and at the same time developed a severe cold with cough and profuse sputum, which was yellow in colour. That was followed by brisk hæmoptysis again. He then had a slightly diminished vesicular murmur at the base of the right lung posteriorly and a few crepitations audible low down in the right axilla. Bronchoscopy at that stage showed blood-stained frothy secretion coming from the bronchus to the lower lobe of

the right lung, finally identified as coming from the medial and posterior basic divisions. The mucosa of the right bronchial tree appeared normal. No foreign body or bleeding granulation tissue could be seen. The left bronchus and main divisions were also normal in appearance, and no foreign body was seen. On September 29, 1948, Dr. Russell Howard performed a thoracotomy and removed the middle and lower lobes of the right lung. The child's condition was good throughout the operation, but blood in the trachea was considered an indication for post-operative bronchoscopy and aspiration of blood. The post-operative course was excellent. The X-ray report on October 1, 1948, was as follows:

> Right seventh rib removed almost completely. Upper lobe almost fully re-expanded. No mediastinal shift.

One week later the appearances were unchanged. Dissection of the lung specimen revealed a grass seed in the middle basic bronchus of the lower lobe of the right lung. The bronchus was dilated and there was a considerable degree of scarring in the adjacent lung tissue. In April, 1949, it was reported from the boy's home that he was very well.

Dr. Southby said that the case was a very interesting example of inhalation of foreign body in which there was no clinical history of inhalation and in which there was no means of seeing it. Recurrent hæmoptysis should always rouse suspicion of a foreign body.

Hæmoptysis due to Inhaled Foreign Body.

DR. T. DUDLEY HAGGER presented a patient with hæmoptysis due to an inhaled foreign body. He said that the patient, a girl, was ten years old when she first attended the Children's Hospital in April, 1946. For two years she had had frequent colds and a persistent cough with sputum that was sometimes yellow and sometimes mucoid. For the same period of time she had had a poor appetite and general ill health. On examination she was under the average weight for her age, and over a period of several months she was found to have variable areas in the left lung showing physical signs which were regarded as indicative of bronchitis and bronchopneumonia. X-ray examination showed mucosal thickening in both antra and shadows in the left lung which were regarded by the radiologist as being caused by bronchopneumonia in the lower lobe, followed by the same condition in the upper lobe, and later pleural thickening around the upper lobe. At that stage the child seemed to fall into that common group of sickly children unduly prone to respiratory infections. The next phase of her illness began in September of the same year, when she had hæmoptysis, coughing up one or two ounces of material. That rather changed the outlook, as on that occasion she presented to hospital as a girl aged eleven years, with an attack of hæmoptysis and physical signs at the apex of the left lung of diminished movement, impaired percussion note and diminished breath sounds. In addition a review of her X-ray films raised a suspicion that a cavity was visible in one of the films. It was not surprising that she was admitted to the wards with a provisional diagnosis of pulmonary tuberculosis of adult type. However, the Mantoux test yielded a negative result with 1:100 old tuberculin, and no tubercle bacilli could be found in her sputum. A bronchogram was obtained and the report stated that the bronchial tree, in particular that portion in the upper lobe of the left lung, was radiographically normal. She remained in hospital for one month, at the end of which she was reported to be well, afebrile and free of cough. When interviewed in the out-patient department some weeks later her cough, sputum, raised temperature and physical signs at the apex of the left lung had recurred, but it was decided to await developments.

In the following January (1947) two more hæmoptyses occurred, and it was decided to readmit the patient to hospital for bronchoscopic examination. That revealed an area of granulation tissue just inside the left upper-lobe bronchus, the remainder of the visible bronchial tree being normal. Treatment with penicillin inhalations was carried out for a month, at the end of which time a further bronchoscopic examination showed the area of granulations to be smaller. The patient was then sent home to continue the same treatment, but it soon became evident that there was no real improvement in her condition, and on the assumption that the bronchial granulating area might be an ulcerated bronchial adenoma, another bronchoscopic examination was carried out and a piece of the granulation tissue was removed for microscopic section. The biopsy report was as follows:

> Mucous membrane of polypoid type with intact columnar epithelium showing some metaplasia to squamous type. Intense inflammatory cell aggregation throughout. No evidence of bronchial adenoma.

Before further treatment or examination could be undertaken the patient solved the diagnostic problem by coughing up a foreign body, consisting of a piece of bone of irregular shape, approximately one-quarter of an inch in diameter, and having several sharp edges. Subsequent inquiry from the child's parents failed to bring to light any occasion on which this could have been inhaled, except that at the age of two years she had "swallowed" a fish bone; but there had been no coughing or respiratory distress on that occasion so far as could be remembered, and there had then been a latent interval of six years before any symptoms developed. After extruding the foreign body the patient made a good recovery; her chest was clinically normal in six months, and since had been shown to be within normal limits both by bronchoscopic and radiological examination. She had gained forty pounds in weight in the subsequent two years.

Dr. Hagger suggested that features of the case worthy of discussion were, firstly, the presence of a foreign body in the left upper-lobe bronchus, a rather unusual situation; secondly, the difficulty of making the diagnosis even after repeated bronchoscopy; thirdly, the question as to what should have been the next step in the event of the patient's not having come along with the crucial evidence.

DR. ALAN PENINGTON expressed the opinion that the X-ray films suggested that the foreign body had at different times obstructed the bronchi to the lingula and to the upper lobe. He asked whether the site of lodgement had been near the origin of the lingular bronchus. With regard to the management of the case in the event of the foreign body's not having been coughed up, he said that there was little doubt that the eventual answer would have been lobectomy. He considered that the case was further evidence, if such was necessary, of the great value of bronchoscopy in chest conditions.

DR. GWYNNE VILLIERS also considered that the radiological evidence favoured the opinion that the foreign body had obstructed first the lingula bronchus and then the bronchus to the remaining portion of the upper lobe.

Dr. Raymond Hennessy, replying to Dr. Penington, said that when he performed the bronchoscopic examinations the site of the lesion appeared to be just inside the upper-lobe bronchus. He would think it to have been some little distance away from the lingular bronchus, but would not be certain on that point.

Dr. Hagger, in reply, said that the possibility of alteration in the site of lodgement had been discussed at the time of the production of the foreign body by the patient. Another possible explanation of the shifting signs was the irregular proliferation of granulation tissue. Cases had been described in which such proliferation had spread from a lower-lobe bronchus as far as the bifurcation of the trachea, and had at different times caused partial or complete obstruction.

Gout in a Boy Aged Ten Years.

DR. MEDWYN HUTSON presented a boy, aged ten years, with the astonishing diagnosis of gout. He said that the boy's father had been a sufferer from gout since the age of fifteen years; in recent years there had been progressive deformity of the joints and numerous large disfiguring tophi. The boy's great-grandfather was also a victum, and two cousins probably had the disease. The inheritance of the disorder was clearly strongly suggested. The boy's early history was uneventful, and there were two older sisters in good health, although one of them was very obese. In his ninth year he complained occasionally of transient severe pains in one or other foot, and his father was wont to remark that he must be getting gout. In his tenth year he had a sudden nocturnal attack of acute pain and swelling in the left great toe, which subsided in several days, and two weeks later a very severe attack in the right metatarso-phalangeal joint. When examined at that stage the joint was swollen and acutely tender and the skin had a suffused shiny-red colour. The lad would wince with anticipated pain if a hand ever approached the joint and would not allow it to be touched. It was a surprise to find several small but quite definite tophi on both ears, which the father suspected had appeared during the past few months. General examination revealed no abnormality, X-ray examination of the feet did not show any evident lesion, but the level of the serum uric acid was 8·8 milligrammes per 100 millilitres. He was given tincture of colchicum, minims seven thrice daily, in a salicylate mixture. The acute pains subsided in two days, and there was some fine desquamation over the affected area as the swelling disappeared. There was no further attack in the next month. When the boy was examined with his father, the diagnosis was unmistakable.

Dr. Hutson said that gout was a unique disease of ancient ancestry and distinguished genealogy, but apart from the

introduction of cinchophen in 1908 there had been no real change in its treatment since colchicum was discovered in the fifteenth century. In recent years very few articles had appeared on the subject and it had almost disappeared from the indices of medical literature; so far as pædiatrics was concerned it did not find a place in the text-book of Mitchell and Nelson or in Brennerman's "Practice of Pædiatrics". Gout was associated with an inherent fault in purin metabolism, which persisted throughout life; it was characterized by periodic attacks of inflammation in the joints, either acute or chronic, and was attended in most cases by the deposition of sodium urate in or about the joints. Although gout was certainly associated with an increase in the level of uric acid in the blood, the evidence concerning the mechanism of the anomaly in purine metabolism was conflicting. More than 95% of the cases occurred in males and the onset was seldom before the age of thirty-five years, although rare cases had been described in children. Allbutt had described a case with tophi in a boy, aged ten years, in 1904. The pattern of periodic acute arthritis with absolute freedom from pain in the intervals in the early stages set gout apart from all the other common varieties of rheumatism. That fact had been particularly emphasized by Hench and might be, of itself, sufficient to make the diagnosis, even before the appearance of the classical sequence of "toe and tophies". Other distinguishing points were the nocturnal onset, location in the bunion joint in the majority of the cases, although not in all, the severity of the pain, the bluish-red discoloration and the subsequent desquamation. The periodic pattern could easily be distinguished from recurrences of rheumatic fever and had no resemblance to the relentless downhill course of rheumatoid arthritis, or the progressive disability of osteo-arthritis. Elevation of the serum uric acid content above the normal line of four to six milligrammes per 100 millilitres was diagnostic. The usual X-ray finding was the occurrence of multiple punched-out areas in the ends of the small bones of the hands or feet, and later the irregular destruction and erosion of articular bone. The tophi which contained sodium urate were, of course, absolutely diagnostic.

The treatment of the acute attack was in general fairly satisfactory. Colchicine had a specific effect and might be given in doses of one one-hundredth of a grain every three or four hours until nausea, vomiting or diarrhœa occurred as warning symptoms of intoxication. Tincture of colchicum was effective, but was said to be less reliable in its effects. It was the only preparation available at present. Free administration of fluids together with the use of salicylate and bicarbonate was also recommended until the attack had subsided. In general a diet free of purine or of low purine content should be instituted. In the interval management the patient must realize that there was no absolute cure for gout, but that the frequency and severity of attacks could be reduced by a suitable regimen. Adherence to a purine diet of low purine content, the deficiency of protein being made up by the use of eggs, cheese *et cetera*, should become a lifetime habit. Excess of fat and alcohol, which might also produce attacks, should be avoided. Some preferred that meat should be allowed once or twice weekly. Some authorities recommended that salicylates and alkalis should be used for two or three days of each week as a permanent programme. If that was ineffective the use of cinchophen should be considered. The regular dose was 0·5 gramme thrice daily on three days of each week. Its use should be controlled by uric acid estimations. It certainly prevented uric acid retention, probably by its effect in preventing tubular reabsorption of uric acid. The danger was the potential toxicity, and although rare (less than 1%), acute fatal yellow atrophy of the liver might follow its use. For that reason Hench was opposed to it except when all other means failed.

Dr. Hutson said that the prognosis in the case of the boy was uncertain. It seemed reasonable to be guided by the history of the illness in his father whose attacks had begun at a comparable age. Although he was handicapped by multiple tophi and deforming arthritis, he still retained relatively good health at the age of fifty-three years.

Raynaud's Phenomenon in a Girl Aged Thirteen Years.

Dr. Hutson then presented a girl, aged thirteen years, exhibiting the characteristic features of Raynaud's phenomenon. She had first attended for consultation in the winter of 1948 and complained of attacks of coldness, blueness and numbness of both hands. Those attacks were brought on by cold, either of the hands themselves or of the body generally, and occurred several times each day. Sometimes the hand would remain blue for an hour or more. There had been also dryness and scaling of the tips of the fingers, but no ulceration or infection. There was no family history of similar disability. She had had only minor illnesses previously, but was of a languid temperament and never a really robust girl. Her general health was satisfactory, and on examination, she had no systemic abnormality. The hands were cold to the touch and the fingers of both hands were of a moderately deep blue colour, the cyanosis extending slightly onto the dorsum of the hands. There was superficial thickening of the skin at the tips of several fingers. On warming, the hands rapidly regained their normal colour, with a sensation of tingling and reactive erythema. The patient was advised to avoid cold, especially cold water, to keep the body warmly clad, and to wear gloves constantly during cold weather. Attacks continued frequently during the winter, but practically disappeared during the summer months. With the onset of the winter of 1949 the attacks had begun again, and on several occasions the toes had been seen to undergo the same colour changes. Most often the hands became pallid before the cyanosis occurred, and the duration of the cyanosis varied greatly. The fingers had not shown the extreme pallor and coldness commonly called "dead fingers" on more than a few occasions. There had been no cyanosis of the nose or ears.

Dr. Hutson observed that the term Raynaud's disease had been applied to a wide variety of conditions in which peripheral cyanosis might be a feature. In the past that had been very confusing, but the position was clarified to a large extent by Hunt in his review of the subject published in 1936. Raynaud's phenomenon could be defined as intermittent cyanosis of the extremities precipitated by exposure to cold. That definition excluded many conditions in which vascular phenomena were continuous, for example, chilblains, acrocyanosis, gangrene, and various nerve lesions. If Raynaud's phenomenon was present, there were several distinct groups of conditions which must be considered in differential diagnosis. Firstly, Hunt had pointed out that the phenomenon might occur in normal persons who were exposed to cold sufficiently long to lower the blood temperature; in that instance it might be regarded as a protective mechanism to conserve body heat. The second condition was hereditary cold fingers. There was a group in which the onset was most often in childhood, was often associated with a family history of similar disability, and affected both boys and girls. In that group local syncope in its simplest form occurred and was brought on by cold. The attacks varied from slight pallor of the fingers to cyanosis and numbness of all the fingers of both hands. The attacks might last as long as the hands and body remained cold. On warming, the fingers quickly regained their normal colour, although tingling often occurred in the recovery phase. The condition usually remained stationary, or might even disappear, and rarely caused serious disability. For that reason Hunt considered it to be of a different nature from Raynaud's disease, although Lewis regarded it as a different degree of the same pathological process. In treatment attention to adequate warmth only was required and sympathectomy was not indicated. In the third group, that to which the term Raynaud's disease was restricted, the condition affected women exclusively and the average age at onset was thirty years. Attacks occurred of a similar nature to those previously described, and were precipitated by cold or occasionally by emotion. There was no relationship to chilblains, there was no hæmoglobinuria, and the nose and ears were not affected. Without treatment the attacks became steadily worse and were disabling. Sympathetic ganglionectomy helped in nearly all cases. The immediate results were excellent, but usually slight symptoms returned. The condition was due to some "local fault" in the vessels of the order of size of the digital arteries. According to Lewis, the improvement after ganglionectomy was due to the removal of the normal element of vaso-constriction tone, so that a higher threshold of cold was needed to produce an attack. The local fault in the vessels causing the excessive reaction to cold remained unaffected. Fourthly, Dr. Hutson pointed out, Raynaud's phenomenon also occurred after local injury to a particular finger and as an occupational disorder in workers with vibrating tools. Fifthly, in sclerodactyly, Raynaud's phenomenon might occur for several years before the development of permanent coldness, cyanosis and thickening of the skin of the extremities led to the correct diagnosis. Finally, there were those cases in which the phenomenon occurred as an incident in the development of gross vascular disease of the extremities, as in Buerger's disease and arteriosclerosis. In that group might also be placed those cases in which hæmoglobinuria and necrosis of the nose and ears occurred and which were always associated with a definite history of syphilis or at least a Wassermann reaction.

Dr. Hutson said that in the case of the girl under discussion, one might conclude that she exhibited Raynaud's

phenomenon, and that the local syncope occurred in simple form. She should probably be classified as suffering from hereditary cold fingers, although observation over several years might be necessary before one could say that the condition was not the progressive one of Raynaud's disease with an unusually early onset.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held in the Anatomy Lecture Theatre, Frome Road, Adelaide, on June 3, 1949. Dr. T. L. McLarty read a paper entitled "Preliminary Observations on Hyaluronidase Activity in Glaucoma". He pointed out that in 1936 Meyer had isolated from the vitreous humour a polysaccharide to which he gave the name hyaluronic acid. That substance might be broken down by chemical means or by enzyme activity into its constituents—glucouronic acid and glucosamine. Such an enzyme was found in testicular tissue and in certain bacterial cultures. Meyer had also noted that in glaucoma the aqueous humour contained glucosamine in greater concentration than normal. That raised the possibility that glaucoma patients harboured organisms producing an hyaluronidase and that aspect was investigated. Swabs were taken from the nose, throat and gum margins and, after their incubation, the cultures were tested for hyaluronidase activity. That could be done by observations on alterations in viscosity of a suitable substrate, such as that prepared from bovine vitreous. Hyaluronidase activity was studied in twenty cases of glaucoma and in twenty controls; in both series enzyme activity occurred with a tendency towards greater activity in the cases of glaucoma, but Dr. McLarty emphasized the fact that, with the small number of cases investigated, the results must be considered as only preliminary and that further work was necessary.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Courses for Part I of M.S., D.G.O., D.L.O., and D.O.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that courses for candidates for Part I of the degree of Master of Surgery and diplomas in gynæcology and obstetrics, laryngology and otorhinology, and ophthalmology will begin on August 29, 1949, for a period of twelve weeks. All lectures and demonstrations will be held in the afternoons only. Those wishing to attend are requested to communicate with the Course Secretary of the Committee. A fee of £26 5s. is payable for attendance at each course.

Course of Demonstrations in Surgical Pathology.

A series of twelve demonstrations in surgical pathology will be conducted by Dr. V. J. McGovern in the Pathology Department, New Medical School, beginning Tuesday, October 4. These demonstrations, lasting approximately one and a half hours each, will be held twice weekly for six weeks on Tuesdays and Fridays at 4.30 p.m. Fee for attendance will be £6 6s., and application should be made to the Course Secretary.

Course in Gynæcology and Obstetrics.

A course in gynæcology and obstetrics will be held at the Women's Hospital, Crown Street, Sydney, for one week beginning November 14. Residence for twelve post-graduate students is available, and early application to the Course Secretary of the Committee, 131 Macquarie Street, Sydney, is essential. Telephones: BU 5238, BW 7483.

SEMINARS AT ROYAL PRINCE ALFRED HOSPITAL.

THE following seminars will be held at Royal Prince Alfred Hospital, Camperdown, New South Wales, on Friday afternoons in September, 1949. Each seminar will be held in the A2 lecture theatre between 1.15 p.m. and 2.15 p.m., and will be followed by a pathological demonstration, staff rounds, and, at 4.15 p.m., grand rounds at Professor Lambie's department (Atherden lecture theatre). All members of the medical profession are invited to attend.

September 9: "Basal Tuberculosis"; September 16: Clinico-Pathological Conference; September 23: "Angiocardiography"; September 30: "Hyperparathyreoidism". There will be no seminar on September 2.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 52, of July 14, 1949.

PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

Appointments.—John William McCaw and Samuel Francis Hewitt Haughton are appointed Surgeon Lieutenants (for short service), subject to such appointments being deemed to be temporary service for the purpose of the *Defence Forces Retirement Benefits Act*, 1948, dated 18th January, 1949, and 1st February, 1949, respectively.

AUSTRALIAN MILITARY FORCES.

Royal Australian Army Medical Corps.

VX14663 Major (Temporary Colonel) C. W. Nye, E.D., from command 130th Australian General Hospital is appointed to command British Commonwealth Occupation Force General Hospital, 16th February, 1949.

SX700031 Captain P. G. Jay is appointed from the Reserve of Officers, 11th January, 1949.

The following officers are transferred to the Reserve of Officers (Royal Australian Army Medical Corps): Captains SX700031 P. G. Jay (4th Military District), 2nd April, 1949, SX700022 R. A. Kenihan (4th Military District), 23rd April, 1949, and VX700090 R. W. Klein (3rd Military District), 28th April, 1949.

To be Temporary Major, 21st March, 1949.—VX700063 Captain A. P. Hanway.

Australian Imperial Force.

Australian Army Medical Corps.

To be Temporary Lieutenant-Colonels, 8th March, 1942.—Majors NX455 A. A. Moon, M.B.E., and NX350 E. L. Corlette, M.B.E. (in lieu of the notification respecting these officers which appeared in Executive Minute No. 50 of 1949, promulgated in *Commonwealth Gazette* No. 29 of 1949).

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps.

1st Military District: To be Honorary Captain, 11th April, 1949.—Hugh Harvey Chesterfield-Evans.

2nd Military District: To be Honorary Captain, 12th April, 1949.—Lieutenant J. B. St. Vincent-Welch.

3rd Military District.—Captain W. D. Curtis is retired at his own request, 12th April, 1949.

6th Military District.—Honorary Major the Honourable J. F. Gaha is placed upon the Retired List (6th Military District) with permission to retain his rank and wear the prescribed uniform, 28th April, 1949.

ROYAL AUSTRALIAN AIR FORCE.

Permanent Air Force.

Medical Branch.

John Nelson Diggle, M.B., B.S. (257773), is appointed to a short service commission on probation for a period of twelve months, 10th May, 1949, with the rank of Flight Lieutenant.

Reserve.

Medical Branch.

The following former officers are appointed to commissions with the ranks indicated: Temporary Squadron Leader, George Danford Charters (257499), 21st April, 1949; Flight Lieutenant, William Robert Pitney (257530), 13th April, 1949.

The appointment of Temporary Squadron Leader G. Oxer (251201) is terminated, 1st June, 1949.

The following appointments, promotions *et cetera* are promulgated in the *Commonwealth of Australia Gazette*, Number 53, of Monday, July 18, 1949.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force (Active List).

Medical Branch.

The following former officers are appointed to commissions with the rank of Flight Lieutenant, 1st January, 1949: Alan Montgomery Beech (257693), Brian Walle Costello (255909).

The ranks on appointment included in the notifications regarding former Squadron Leader Alva Thomas Pearson (261701) and Dr. William Arthur Newnham (299950) as approved in Executive Council Minute No. 5 of 1949, appearing in *Commonwealth of Australia Gazette*, No. 4, dated 13th January, 1949 (page 83), are amended to read Flight Lieutenant.

Reserve.

Medical Branch.

The appointments of the following officers are terminated, 31st December, 1948: Temporary Squadron Leader A. M. Beech (257693), Flight Lieutenant B. W. Costello (255909).—(Ex. Min. No. 35—Approved 13th July, 1949.)

Correspondence.

AN APPEAL.

SIR: I shall be grateful if the doctor who, whilst travelling from Katoomba on Tuesday, June 14, 1949, rendered first aid to a man, injured as a result of being knocked down by a motor-lorry on the Great Western Highway, about one mile south of St. Marys Railway Station, at approximately 5.30 p.m. on that date, would communicate with me.

Yours, etc.,
P. L. HUGHES.

11 Mimosa Street,
Oatley,
July 20, 1949.

TUBERCULIN SKIN TESTING IN RELATION TO B.C.G. VACCINATION.

SIR: In the brochure issued by the Commonwealth Serum Laboratories for the guidance of those using B.C.G. vaccine, reference is made to the use of the Mantoux test.

It is recommended that for all subjects over the age of ten years, 0·1 cubic centimetre of a 1 in 1000 solution of old tuberculin (0·1 milligramme) be injected intracutaneously into the upper part of the front of the forearm, and that results be read at forty-eight and seventy-two hours. A reaction is recorded as "positive" when there develops an area of inflammation of five millimetres or more in diameter. D'Arcy Hart (Medical Research Council Special Report Series Number 164) defined a positive tuberculous skin reaction as "the typical, delayed, persistent, inflammatory response". Douglas Anderson and Cotter Harvey, in their report to the National Health and Medical Research Council in 1938, described a positive reaction as "an area of œdema at the site of injection. The area of œdema is usually well defined and surrounded by blush".

The diameter of the area of œdema should be measured in millimetres and recorded. Also, any vesiculation, ecchymosis or necrosis should be noted.

In the interpretation of a reaction it is the œdema which is important, and its presence can usually be detected more easily by the pulp of the finger than by the eye.

Those under ten years of age should be tested with 0·1 cubic centimetre of 1 in 10,000 old tuberculin or with a patch test. This patch should remain in position for forty-eight hours and then be removed. The reading is made forty-eight hours after its removal. The reaction may vary from a few minute papules to a red raised area corresponding to the area covered by the patch. Occasionally the reaction spreads beyond this area and becomes irregular in outline. Those who are negative to 1 in 10,000 old tuberculin or to the patch test should be retested with 1 in 1000 old tuberculin.

It is only those who fail to give a positive reaction to the abovementioned tests who should be vaccinated with B.C.G., and, having been vaccinated, they should be retested in eight weeks' time with 0·1 cubic centimetre of 1 in 1000 old tuberculin.

Yours, etc.,
H. W. WUNDERLY.

Commonwealth Department of Health,
Canberra, A.C.T.,
July 14, 1949.

Royal Australasian College of Surgeons.

GORDON CRAIG SCHOLARSHIPS.

THE Council of the Royal Australasian College of Surgeons invites applications for the sixth award of Gordon Craig Scholarships.

1. These scholarships are awarded for the purpose of furthering post-graduate education in surgery and surgical research.
2. Favourable consideration will be given to applicants who intend to present for a senior surgical qualification.
3. Applicants must have been qualified for at least two years.
4. Scholarship holders will be required to carry out whole-time duty at a medical school and/or research institute and/or hospital, although this condition may be varied in exceptional cases.
5. The amount of each scholarship will be at the discretion of the College, but the College is prepared to grant up to £400 a year to suitable applicants.
6. Forms of application, together with details of the regulations governing the award of the scholarships, are available from the Secretary of the Royal Australasian College of Surgeons, Spring Street, Melbourne, C.1.
7. Applications should be lodged with the Secretary and reach him not later than January 31, 1950.

GEORGE ADLINGTON SYME SCHOLARSHIP, 1950.

THE Council of the Royal Australasian College of Surgeons invites applications for the George Adlington Syme Research Scholarship for 1950. The Scholarship is valued at £50. Applicants are requested to give full details of the research work which they desire to undertake. It is preferable that the research should be clinical in nature.

The successful applicant must undertake to publish, in *The Australian and New Zealand Journal of Surgery*, a paper recording the results of his or her work, or to present the result at a lecture to be arranged, should the Council so desire.

Any further information required may be obtained from the Secretary of the College, Spring Street, Melbourne, C.1, with whom applications must be lodged on or before October 31, 1949.

FINAL FELLOWSHIP EXAMINATION.

THE next meeting of the Court of Examiners for the final examination for Fellowship of the Royal Australasian College of Surgeons will be held at the College in Melbourne beginning on Thursday, May 4, 1950. Candidates who desire to present themselves at this examination should apply, on the prescribed form, to the Censor-in-Chief for permission to do so on or before April 1, 1950. The appropriate forms are available from the Secretary, Royal Australasian College of Surgeons, Spring Street, Melbourne, C.1. Candidates who have been approved by the Censor-in-Chief, but who have not yet presented for examination, may present at this examination provided they notify the Secretary of their intention to do so by April 1, 1950. The examination fee is £21 and must be paid to the Secretary by April 1, 1950.

COURSE FOR FINAL FELLOWSHIP EXAMINATION.

SUBJECT to a satisfactory entry being received, the Royal Australasian College of Surgeons will conduct, in Melbourne, a post-graduate course in surgery. It will begin on Thursday, January 19, 1950, and will cover a period of approximately thirteen weeks. The course is suitable for all graduates who wish to undertake post-graduate study in surgery, and

it is not designed solely for those desiring to present themselves for senior surgical qualifications. Lectures and lecture demonstrations will be arranged in the surgical specialties. These will be announced in detail after receipt of entries which close on December 15, 1949. Lectures and lecture demonstrations in pathology will also be arranged. A detailed syllabus is available on application to the Secretary, Royal Australasian College of Surgeons, Spring Street, Melbourne, C.1. The fee for the course is £31 10s. *plus* exchange on cheques drawn on banks outside Melbourne, and should be forwarded with entries.

Obituary.

ALICE MARY BARBER.

WE are indebted to Dr. H. Selby Link for the following appreciation of the late Dr. Alice Mary Barber.

Dr. Alice Barber died, after a short illness, on Sunday, May 8, 1949, and those of us in the profession who are interested in the practice of psychological medicine feel that we have lost not only a friend, but one who was an inspiration in a difficult field of endeavour.

Alice Barber graduated at the University of Melbourne in 1906 at the age of twenty-two years and then did general medical work at Warrnambool and at Creswick Hospital, where she was resident surgeon. She married in 1908 and went to India, returning to Australia in 1915, when for a time she assisted Dr. Roberta Donaldson in running the Women's Hospital in place of the men who had gone to the war. She returned to India after the Great War and was mainly occupied with family affairs, but was always a great reader—particularly in philosophy and psychology. From 1930 to 1934 she became more and more dissatisfied with existing beliefs and eventually became convinced that she should take up psychotherapy in earnest. She left India for this purpose in 1935, and she trained and worked at the Tavistock Clinic, London, until 1937, when she returned to Melbourne and commenced practice in psychotherapy.

During the last twelve years her activities, apart from the treatment of private patients in Collins Street, included work at the psychiatric clinic at the Children's Hospital, and consultant work at the Queen Victoria Hospital, together with a great deal of lecturing at the University of Melbourne, at the Council of Adult Education and at the Clinic for Psychotherapy. She was instrumental in founding the Clinic for Psychotherapy at 130 Gipps Street, East Melbourne, which came into existence two years ago. She was the senior superintendent of this institution, and her patience and wisdom were a never-ending source of strength and inspiration to the members of the staff.

HAROLD SKIPTON STACY.

WE are indebted to Dr. George Willcocks for the following appreciation of the late Dr. Harold Skipton Stacy.

Let us praise famous men. Dr. Harold Skipton Stacy, who died on June 2, 1949, was a remarkable man. He was essentially a gentleman—if that word still conveys its meaning. He was not a man who sought publicity. He was a far greater man than many who have gained fame and comparative wealth in the medical world. It is not easy to express one's ideas about a man. He was unassuming, courageous, cheerful in adversity, generous, energetic and gifted with a broad outlook. He was a leader among men, though perhaps not always recognized or acclaimed as such by the public. He was a Christian, and he was long actively connected with the Church of England.

At the University of Sydney he distinguished himself on the cricket field and represented his university at this game. On leaving the university he was a resident medical officer at Sydney Hospital and later pathologist at that institution. He took his doctorate of medicine in pathology, but he turned to surgery and eventually became senior surgeon at his hospital.

He had ideas and enthusiasm, and when he took the Third Casualty Clearing Station to Europe in the 1914-1918 war, he set out to take the best equipped casualty clearing station of the war, and many say that, owing to his foresight and imagination, he did what he set out to do in that respect.

He was a moving figure in the founding and development of Saint Luke's Hospital. He was a member of the Board of Directors from 1919 to 1948. He was mainly responsible for the beginning and development of Cranbrook School, a school which numbers its alumni by thousands. He was a Foundation Fellow of the Royal Australasian College of Surgeons. At Saint Luke's his wide knowledge and keenness led to the introduction of all that was modern in connexion with diagnosis and treatment. He foresaw the developments in anæsthesia and in radiology and laid down principles for these specialties.

Skipton Stacy was a devoted husband and father. He lost his wife and one of his sons under tragic circumstances, but his spirit was undaunted. Henley might well have written those lines for Stacy himself: "Under the bludgeonings of fate I have not winced nor cried aloud."

A man who can play cricket, become a great surgeon, be a leader in war, and be a founder of a great hospital and of a great school, scarcely needs an epitaph. His memory will be sustained by remembrance of his character and his example, for there is no truer saying than that example is better than precept.

The "Skipper", as he was known at Sydney Hospital, had courage, perseverance and a quiet mind—virtues which Robert Louis Stevenson prayed for, as among the highest attributes of man. Much has been omitted; neither his humour, his patience nor his kindliness has been extolled; but after all these virtues are just those of a gentleman. To sum up his character, it would be no exaggeration to call him a "great gentleman".

Dr. Douglas Anderson writes: Dr. Stacy never grew old. Even when he was in his seventies he had few grey hairs and was as tall and soldierly as when I first met him. That was about twenty years ago when I entered the surgical wards of Sydney Hospital as a student. He was then senior surgeon. I remember him well in his double-breasted blue suit in the midst of a concourse of white coats, talking in a low but resonant voice. At the end of each sentence he would pause and look interrogatively through his large round glasses at his hearers for their acquiescent nod. He was very conscious of his duty to teach, and I used to think that he was one of the best of our clinical teachers. If he had a hobby-horse, it was the principle of dependent drainage for septic wounds. After I graduated, it was my good fortune to become his house surgeon. I used to admire his devotion to his hospital work, his imperturbability, his forthrightness and his cheerful philosophy. He had a great and oft-expressed contempt for Sunday newspapers and a dry, sometimes rather cynical humour.

After his retirement from Sydney Hospital I would see him at Saint Luke's occasionally. He would always turn the conversation to the merits of this or that new drug or procedure and was as keen as ever to be abreast of the most recent advances in practice.

I am sure that very many Old Sydney Hospitallers, of all vintages from the late nineties to the middle thirties, have pleasant and kindly recollections of "the Skipper".

Dr. Guy Griffiths writes: Fifty years ago Sydney Jamieson, honorary pathologist to Sydney Hospital, had in succession three excellent residents, James Isbister, Cedric Bowker and Harold Stacy. Romanowsky's method of staining blood films with eosin and methylene blue was then replacing Ehrlich's method of fixing by heat and staining with his triacid solution, a tedious, difficult and not entirely satisfactory method. Adopting the Romanowsky method, Stacy became very keen on clinical examination of the blood and made many tests, not only on Jamieson's own patients, but also on those of other physicians, who permitted though they did not seek them. He used these as the basis of the thesis for which he was awarded the M.D. degree; they included many cases of hydatid disease. He published them in a small brochure. Some years later Professor Welsh read a paper on clinical investigation of the blood in hydatid disease and was disappointed to find that he was not the first in the field.

When Stacy devoted himself to surgery his interest in pathology still continued; thus in 1917 many post-mortem examinations were made in his casualty clearing station on soldiers killed in France and he learnt how much more extensive often were the effects of high explosives within the chest and abdomen than any external wounds suggested; this was sadly confirmed some twenty years later when "blast" injuries were so common, even in civilians.

Stacy always had a fund of dry humour; in his youth he was a great wag. A favourite joke was to parade King Street, Newtown, on Saturday night, arrayed in frock coat and silk hat and carrying a "la de dah" cane and gloves; there he would be jostled by his friend "Caffey" Reid, disreputably dressed for the occasion. Strangely enough, when "Stace" upbraided the other as an ill-mannered and useless ragamuffin and threatened to administer a well-deserved thrashing, the crowd usually sided with the aggrieved swell and would call the police to his rescue; but a group of Andrew's men hovering watchfully on the outskirts would hurry off the belligerents in different directions. Apparently modern medical students still play similar joyous pranks.

JAMES ERNEST PIPER.

We are indebted to Dr. H. F. H. Elvins for the following appreciation of the late Dr. James Ernest Piper.

Dr. James Ernest Piper, of Geelong, died on May 25, 1949. He had been in indifferent health for some time, but carried on with his work till about eight months before his death when he retired from active practice. News of his death was received with great regret and a keen sense of personal loss by his professional colleagues and his numerous friends and patients, who had known and appreciated his genial personality, his professional skill, his untiring attention and sympathetic care in times of sickness and distress.

He was born at Ceres, six miles from Geelong, and received his early education at the Ceres State School and Geelong College before entering Ormond College to begin his medical studies at the University of Melbourne. After a successful university career he graduated M.B., B.S., and was appointed as a resident medical officer at the Melbourne Hospital. He was afterwards on the staff of the Women's Hospital, Melbourne, and took the degree of M.D. before commencing the practice of his profession in Geelong, where he subsequently carried on a very extensive general practice for about thirty-four years. He was appointed to the honorary staff of the Geelong Hospital, being first honorary pathologist for a number of years, later on honorary indoor surgeon and finally honorary consultant to the hospital. He also has been honorary secretary and president of the Geelong Subdivision of the British Medical Association. He acted as medical officer to the Saint Augustine and Saint Catherine Orphanages for a number of years, where he was held in high regard by the children and the members of the staff.

He took a great interest in all matters relating to public health and was medical officer of health to the municipalities

DISEASES NOTIFIABLE IN EACH STATE AND TERRITORY OF AUSTRALIA AND NOTIFICATIONS FOR THE WEEK ENDED JULY 9, 1949.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	..	..	..	1	..	..	..	1
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	3	1	1	..	..	..	..	..	5
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(a)	*	*	..	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	..	..	..	..	..	..	..
Diphtheria	18	3	7	..	3	..	..	..	31
Dysentery(b)	*	..	..	..	1	..	..	..	1
Encephalitis Lethargica	..	1	..	..	..	..	..	..	1
Erysipelas	*	*	*	1	*	*	..	..	1
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	..	*	*	*	*	..
Hydatid	*	1	*	*	..	*	*	..	1
Influenza	*	*	*	..	*	*	..	*	..
Leprosy	..	..	..	..	5	..	..	..	5
Malaria(c)	*	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)
Measles	*	*	*	89	*	*	..	..	89
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	23	..	2	2	..	..	..	27
Psittacosis	*	..	*	..	*	*	*	*	..
Puerperal Fever	..	..	..	1	..	..	..	..	1
Rubella	*	*	*	*	1	*	..	..	1
Scarlet Fever	27	16	11	9	5	3	..	..	71
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	..	1	*	1	*	*	*	2
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(d)	29	12	13	5	9	5	..	..	73
Typhoid Fever(e)	..	..	..	..	..	..	..	..	..
Typhus (Endemic)(f)	..	..	1	..	..	..	..	..	1
Undulant Fever	..	1	..	1	..	..	..	..	2
Weil's Disease(g)	*	*	..	*	*	*	*	*	..
Whooping Cough	*	*	*	14	*	*	..	..	14
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 36, 1944-1945.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from Northern Territory.
* Not notifiable.
(a) Includes "Mossman" and "Sarina" fevers. (b) Includes amœbic and bacillary. (c) Statistics inexact with varying practice with regard to relapses in Service cases infected overseas. (d) Includes all forms except in New South Wales and Northern Territory, where only pulmonary tuberculosis is notifiable. (e) Includes enteric fever and paratyphoid fevers. (f) Cases reported are all of the mild type known as Brill's disease or endemic typhus (including scrub and urban types). (g) Includes leptospiroses, Weil's and para-Weil's disease.

of Geelong West, Barrabool and Corio, and to the city of Geelong during the war years. His persistent and insistent advocacy of immunization against diphtheria was largely instrumental in bringing about the organization of the successful campaigns against this disease and he also had charge of the tuberculosis clinic at Geelong. The establishment of the Geelong Ambulance Service received his fullest support, and, under his capable leadership, it has developed into a most efficient organization.

As a sportsman he was well known, and, from his schooldays, he excelled in football, cricket and tennis. At the university he was a member of the Ormond College and university teams. He played one season with the Geelong Football Club and was president of the club in 1925 when Geelong won the league premiership. He was also medical officer of the club for over thirty years.

As a churchman, Dr. Piper was a member of Saint Paul's Church of England, Geelong, and occupied several important positions in the service of the church. At a very impressive funeral service in Saint Paul's on May 27, 1949, the vicar, the Reverend Dr. Griffith, paid an eloquent tribute to the life and work of Dr. Piper, while the very large congregation of representative citizens reverently gave silent testimony to the very high esteem in which our late colleague was held by all sections of the community.

HERBERT JAMIESON STEWART.

We regret to announce the death of Dr. Herbert Jamieson Stewart, which occurred on July 16, 1949, at Ashgrove, Queensland.

WILLIAM GOODWIN CHADBOURNE CLARK.

We regret to announce the death of Dr. William Goodwin Chadbourne Clark, which occurred on July 18, 1949, at Bracknell, Tasmania.

Nominations and Elections.

The undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Currow, Elwin George, M.B., B.S., 1948 (Univ. Sydney), 12 Maitland Road, Cooranbong, New South Wales.

Mair, John Russell, M.B., B.S., 1948 (Univ. Sydney), Flat Number 3, 102 McPherson Street, Cremorne.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Haneman, Samuel, registered in accordance with the provisions of Section 17B of the *Medical Practitioners Act*, 1938-45, 54 Warner's Avenue, Seven Ways, Bondi.

Howell, William Hessel, M.B., B.S., 1948 (Univ. Sydney), Marrickville District Hospital, Marrickville.

Khan, Edward Joseph, M.B., B.S., 1941 (Univ. Sydney), Smith Street, Fairy Meadow.

Lehmann, Geoffrey Maxwell, M.B., B.S., 1947 (Univ. Sydney), Kenmore Mental Hospital, Kenmore.

Moloney, Noreen Loreto, M.B., B.S., 1948 (Univ. Sydney), Emeralda, Junee.

Rutherford, Ronald James, M.B., B.S., 1942 (Univ. Sydney), 12 Douglas Street, Randwick.

Sinclair, Bruce Alexander, M.B., B.S., 1947 (Univ. Sydney), 14 Carabella Street, Kirribilli.

St. Vincent Welch, John Basil, M.B., B.S., 1948 (Univ. Sydney), No. 2 Flat, 14 Murdoch Street, Cremorne.

Medical Appointments.

Dr. H. J. Ellis has been appointed resident anæsthetist at the Royal Adelaide Hospital, Adelaide.

Dr. F. C. Archibald has been appointed surgical registrar at the Royal Adelaide Hospital, Adelaide.

Dr. R. Hecker has been appointed pathological registrar and resident clinical pathologist at the Royal Adelaide Hospital, Adelaide.

Dr. A. E. Coates has been appointed a member of the Queen's Memorial Infectious Diseases Hospital Board, Fairfield, Victoria.

Diary for the Month.

AUG. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 3.—Victorian Branch, B.M.A.: Branch Meeting.
AUG. 3.—Western Australian Branch, B.M.A.: Council Meeting.
AUG. 4.—South Australian Branch, B.M.A.: Council Meeting.
AUG. 5.—Queensland Branch, B.M.A.: Branch Meeting.
AUG. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
AUG. 11.—Victorian Branch, B.M.A.: Organization Subcommittee.
AUG. 12.—Queensland Branch, B.M.A.: Council Meeting.
AUG. 15.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
AUG. 16.—New South Wales Branch, B.M.A.: Medical Politics Committee.
AUG. 17.—Western Australian Branch, B.M.A.: General Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135 Macquarie Street, Sydney): Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester United Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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